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Summary

The effects of empennage arrangement and afterbody boattail design (upper/lower nozzle-flap boattail angle versus nozzle-sidewall boattail angle) of nonaxisymmetric nozzles on the aeropropulsive characteristics of a twin-engine fighter-type model have been determined in an investigation conducted in the Langley 16-Foot Transonic Tunnel. Three nonaxisymmetric and one twin axisymmetric convergent-divergent nozzle configurations were tested with three different tail arrangements: a two-tail V-shaped arrangement; a staggered, conventional three-tail arrangement; and a four-tail arrangement similar to that on the F-18. Two of the nonaxisymmetric nozzles were also vectorable. Tests were conducted at Mach numbers from 0.60 to 1.20 over an angle-of-attack range from $-3°$ to $9°$. Nozzle pressure ratio was varied from 1 (jet off) to approximately 12, depending on Mach number.

Results of this study indicate that at design nozzle pressure ratio, the medium-aspect-ratio nozzle (with equal boattail angles on the nozzle sidewalls and upper and lower flaps) had the lowest zero-angle-of-attack drag of the nonaxisymmetric nozzles for all tail configurations at subsonic Mach numbers. The drag levels of the twin axisymmetric nozzles were competitive with those of the medium-aspect-ratio nozzle at subsonic Mach numbers and clearly had the lowest drag at a Mach number of 1.20. Unfavorable tail interference effects were present at all test conditions. Tail interference drag increments increased with increasing subsonic Mach number, a result accounting for as much as 60 percent of the drag on the entire aft end at a Mach number of 0.90. The four-tail arrangement generally produced the most unfavorable interference, and the medium-aspect-ratio nozzle generally had the least unfavorable tail interference at subsonic Mach numbers.

Introduction

The mission requirements for the next generation of fighter airplanes may define a very versatile and agile vehicle capable of operation over a wide range of flight conditions and from short or bomb-damaged runways. Meeting these requirements may mean that the airplanes will have variable-geometry multifunction nozzles to provide high internal performance as well as thrust vectoring and reversing. Variable-geometry nozzles cause important aft-end parameters such as aft-end closure and local boattail angles to change continuously throughout the operating range of Mach number, angle of attack, and engine pressure ratio and thus further complicate the already complex flow field associated with twin-engine afterbodies. Many studies have shown that large drag penalties can result from integration of the propulsion system into the airplanes because of adverse interactions originating from empennage surfaces, base areas, actuator fairings, and tail booms (refs. 1 to 5).

Considering the effect of the aforementioned requirements, when using nonaxisymmetric nozzles, throat aspect ratio (the ratio of throat width to throat height) is one of the important aft-end design variables. For a fixed nozzle throat area, nozzle exit area, and cross-sectional area of the fuselage nozzle connect station, variations in nozzle throat aspect ratio result in external nozzle boattail variations. For example, a nozzle with a low throat aspect ratio might dictate large sidewall boattail angles (relative to upper/lower nozzle-flap boattail angles) to fair the fuselage into the nozzle exit. Conversely, a nozzle with a high throat aspect ratio (with the combination of increased nozzle throat width and decreased height) dictates more shallow nozzle-sidewall boattail angles and steeper upper/lower nozzle-flap boattail angles. To date, little information is available concerning the effects of trading nozzle-sidewall and upper/lower nozzle-flap boattail angles on installed afterbody performance characteristics.

This paper presents the results of an investigation in the Langley 16-Foot Transonic Tunnel in which the nonaxisymmetric nozzle boattail design (upper/lower nozzle-flap boattail angle versus nozzle-sidewall boattail angle) was systematically varied and compared with a twin axisymmetric nozzle configuration. Three nonaxisymmetric aft-end nozzle configurations were tested representing three different values of nozzle throat aspect ratio. The low-aspect-ratio nozzle had sidewall boattail angles nearly twice the magnitude of the upper/lower nozzle-flap boattail angles. The nozzle configuration with medium throat aspect ratio had equal boattail angles on the nozzle sidewalls and upper/lower flaps. The high-aspect-ratio nozzle resulted in upper/lower nozzle-flap boattail angles approximately twice as large as the nozzle-sidewall boattail angles. Because aft-end aeropropulsive characteristics are often so dependent on configuration (refs. 6 to 8), the interference effects of three different empennage arrangements were assessed in conjunction with the aft-end closure variations. Tests were conducted on the twin-engine propulsion model at Mach numbers from 0.60 to 1.20, angles of attack from $-3°$ to $9°$, and nozzle pressure ratios up to approximately 12.

Symbols

Model forces and moments are referred to the stability axis system with the model moment reference center located 1.75 in. above the model centerline at fuselage station 36.06 in., which corresponds to $0.25\bar{c}$. All coefficients are nondimensionalized with respect to $q_\infty S$ or $q_\infty S\bar{c}$. A discussion of the data reduction procedure and definitions of the aerodynamic force and moment terms and the propulsion relationships used herein are presented in the appendix. The symbols in parentheses appear in the computer printout tables.

A		afterbody model cross-sectional area, in^2
A_e		nozzle exit area, in^2
$A_{\max}$		maximum cross-sectional area of model wing-fuselage combination, 73.64 in^2
$A_{mb,1}$		model cross-sectional area at FS 44.75 and FS 48.25, 49.14 in^2
$A_{mb,2}$		model cross-sectional area at FS 66.25, 38.78 in^2 for axisymmetric nozzle and 38.87 in^2 for nonaxisymmetric nozzles
AR		nozzle throat aspect ratio, Throat width/Throat height
$A_{\text{seal},1}$		cross-sectional area enclosed by seal strip at FS 44.75, 47.18 in^2
$A_{\text{seal},2}$		cross-sectional area enclosed by seal strip at FS 48.25, 47.34 in^2
$A_{\text{seal},3}$		cross-sectional area enclosed by seal strip at FS 66.25, 35.81 in^2 for axisymmetric nozzle and 35.16 in^2 for nonaxisymmetric nozzles
A_t		nozzle throat area, in^2
C_D	(CD)	drag coefficient of entire aft end
$C_{D,\text{aft}}$	(CDAFT)	drag coefficient of afterbody (plus tails)
$C_{D,n}$	(CDNOZ)	drag coefficient of nozzle
$C_{D,\text{tails}}$		drag coefficient of tails
$C_{(D-F)}$	(C(D-F))	drag-minus-thrust coefficient, $C_{(D-F)} \equiv C_D$ at NPR = 1 (jet off)
$\Delta C_{D,ia}$		increment in empennage interference drag coefficient on afterbody (eq. (A13))
$\Delta C_{D,in}$		increment in empennage interference drag coefficient on nozzle (eq. (A12))
$\Delta C_{D,it}$		increment in empennage interference drag coefficient on entire aft end (eq. (A11))
C_L	(CL)	lift coefficient of entire aft end
$C_{L,\text{aft}}$	(CLAFT)	lift coefficient of afterbody (plus tails)
$C_{L,n}$	(CLNOZ)	lift coefficient of nozzle
$C_{L,t}$	(CLT)	total lift coefficient (including thrust component) of entire aft end, $C_{L,t} \equiv C_L$ at NPR = 1 (jet off)
C_m	(CM)	pitching-moment coefficient of entire aft end
$C_{m,\text{aft}}$	(CMAFT)	pitching-moment coefficient of afterbody (plus tails)
$C_{m,n}$	(CMNOZ)	pitching-moment coefficient of nozzle
$C_{m,t}$	(CMT)	total pitching-moment coefficient (including thrust component), $C_{m,t} \equiv C_m$ at NPR = 1 (jet off)
C_p		pressure coefficient, $(p - p_\infty)/q_\infty$
$\bar{c}$		wing mean geometric chord, 14.47 in.
D		drag, lbf
D_f		friction drag, lbf

F_A axial force of entire aft end, lbf

$F_{A,\mathrm{Mbal}}$ axial force measured by main balance, lbf

$F_{A,\mathrm{mom}}$ axial-force momentum tare due to bellows, lbf

$F_{A,\mathrm{Sbal}}$ axial force measured by afterbody shell balance, lbf

F_{aft} axial force of afterbody (plus tails), lbf

F_i ideal isentropic gross thrust (eq. (A3)), lbf

F_j thrust along body axis, lbf

F_N measured normal force, lbf

F_r resultant gross thrust, $\sqrt{F_N^2 + F_A^2}$, lbf

l_{aft} afterbody length, 23.45 in.

g gravitational constant, 32.174 ft/sec^2

M (MACH) free-stream Mach number

NPR nozzle pressure ratio, $p_{t,j}/p_\infty$

p local static pressure, psi

$\bar{p}_{es,1}$ average static pressure at external seal at FS 44.75, psi

$\bar{p}_{es,2}$ average static pressure at external seal at FS 48.25, psi

$\bar{p}_{es,3}$ average static pressure at external seal at FS 66.25, psi

$\bar{p}_i$ average internal static pressure, psi

$p_{t,j}$ average jet total pressure, psi

p_∞ free-stream static pressure, psi

q_∞ free-stream dynamic pressure, psi

R gas constant, 53.364 ft-lb/lb-°R for air

S wing reference area, 664.4 in^2

$T_{t,j}$ jet total temperature, °R

w_i ideal weight-flow rate, lbf/sec

w_p measured weight-flow rate, lbf/sec

x axial distance from FS 48.25, in.

α (ALPHA) angle of attack, deg

β_c nozzle boattail chord angle (see fig. 4(a)), deg

β_t nozzle boattail terminal angle (see fig. 4(a)), deg

γ ratio of specific heats, 1.3997 for air

δ measured resultant thrust vector angle, $\tan^{-1}(F_N/F_A)$, deg

δ_v design thrust vector angle, measured from horizontal reference line, positive down, deg

ρ divergent flap angle (see fig. (4(a)), deg

Subscripts:

l lower

side nozzle sidewall

u upper

Abbreviations:

AXI axisymmetric

BL buttock line, in.

FS fuselage station (axial location described by distance from model nose), in.

HI high aspect ratio

LO low aspect ratio

MED medium aspect ratio

WL waterline, in.

Apparatus and Procedure

Facility

This investigation was conducted in the Langley 16-Foot Transonic Tunnel, a continuous-flow, single-return, atmospheric wind tunnel with a slotted octagonal test section and continuous air exchange. The wind tunnel has a continuously variable airspeed up to a Mach number of 1.30 with test-section plenum suction used for speeds above a Mach number of 1.05. A complete description of the facility and operation characteristics can be found in reference 9.

Model and Support System

Details of the generic, air-powered, twin-engine fighter afterbody model and wingtip support system used in this investigation are presented in figure 1. Photographs of the model and support system installed in the Langley 16-Foot Transonic Tunnel are shown in figure 2. Sketches of the afterbody external geometry are presented in figure 3. Sketches of the nozzles and tails are presented in figures 4 and 5, respectively.

The wingtip support system shown in figure 1 consisted of three major portions: the twin support booms, the forebody (nose), and the wing-centerbody combination. These pieces made up the nonmetric portion (that portion of the model not mounted on the force balance) of the twin-engine fighter model. The fuselage centerbody was essentially rectangular in cross section and had a constant width and height of 10.00 in. and 5.00 in., respectively. The maximum cross-sectional area of the fuselage centerbody was 49.14 in^2. The support system forebody (nose) was typical of a powered model in that the inlets were faired over. For this test the wings were mounted in a "high-wing" position (1.75 in. above the model centerline), an arrangement which is typical of many current fighter designs. The support system wing had a 45° leading-edge sweep, a taper ratio of 0.43, an aspect ratio of 2.4, and a cranked trailing edge (fig. 1(c)). The NACA 64-series airfoil had a thickness ratio of 0.067 near the wing root to provide a realistic wake on the afterbody. However, from BL 11.00 outboard to the support booms, the wing thickness ratio increased from 0.077 to 0.10 to provide adequate structural support for the model and to permit transfer of compressed air from the booms to the model propulsion system.

The metric portion of the model (aft of FS 44.75) was mounted on the main balance and consisted of the internal propulsion system, afterbody, nozzles, and tails (when installed). The afterbody shell from FS 48.25 to FS 66.25 and tails (when installed) were attached to an afterbody balance, which was in turn attached to the main balance. The main balance was grounded to the nonmetric wing-centerbody section. The nozzles were attached to the main force balance through the propulsion system piping. Three clearance gaps (metric breaks) were provided between the nonmetric and individual metric portions (afterbody and nozzles) of the model at FS 44.75, FS 48.25, and FS 66.25 to prevent fouling of the components upon each other. A flexible plastic strip inserted into circumferentially machined grooves in each component impeded flow into or out of the internal model cavity.

In this report, the section of the model aft of FS 48.25 is referred to as *the entire aft end* (which includes afterbody, nozzles, and tails, when installed). The section of the model from FS 48.25 to FS 66.25 is referred to as *the afterbody,* and the section aft of FS 66.25 is considered *the nozzles.* A skin-friction drag adjustment to the axial force measured by the main balance was made for the constant cross-sectional area segment between FS 44.75 and FS 48.25.

The afterbody had a constant cross-sectional area between FS 48.25 and FS 61.30. The external contours of the afterbody-nozzle combination aft of FS 61.30 are provided in figure 3(a). Cross-sectional area distributions for the axisymmetric and nonaxisymmetric nozzle afterbodies are shown in figure 3(b) and are nearly identical for all configurations.

Sketches of the nozzle internal geometry are provided in figure 4. All nozzle configurations represented dry (maximum nonaugmented) power settings of convergent-divergent designs and had a nominal expansion ratio (ratio of exit area to throat area) of 1.4. The three nonaxisymmetric nozzles represented three different nozzle throat aspect ratios (ratio of throat width to throat height), resulting in three different nozzle boattail designs (boattail angle on the upper/lower nozzle flaps versus the boattail angle on the nozzle sidewalls). The low-aspect-ratio (LO) nozzle (fig. 4(a)), which had a throat aspect ratio of 3.5, had an upper/lower nozzle-flap boattail chord angle ($\beta_{c,u/l}$) approximately one-half the magnitude of the nozzle-sidewall boattail chord angle ($\beta_{c,\text{side}}$). The medium-aspect ratio (MED) nozzle (AR = 5.5) had equal boattail chord angles on the upper/lower nozzle flaps and nozzle sidewalls (fig. 4(b)). The high-aspect-ratio (HI) nozzle (AR = 7.5) had an upper/lower nozzle-flap boattail chord angle that was twice the size of the boattail chord angle on the nozzle sidewalls (fig. 4(c)).

Although the nonaxisymmetric afterbody-nozzle models tested represented a twin-engine configuration, exhaust flow from the two individual tail pipes

was exhausted through a common nonaxisymmetric nozzle. In addition to forward mode operation ($\delta_v = 0°$), the medium- and high-aspect-ratio nozzles had the capability for thrust vectoring in the pitch direction. The upper/lower nozzle divergent flaps were rotated about a pivot at the nozzle throat to a setting of $\delta_v = 20°$ for the medium-aspect-ratio nozzle and to settings of $\delta_v = 10°$ and 20° for the high-aspect-ratio nozzle.

The twin axisymmetric nozzles investigated are shown in figure 4(d). As seen, the nozzle external shape is conical over the last 3.15 in. and has an external boattail chord angle equal to 10.0°. Details of the nozzle interfairing region are provided in the table included in figure 4(d).

The afterbody had provisions for mounting horizontal and vertical tails in three different arrangements (fig. 5): a two-tail V-shaped arrangement (twin vertical tails only with a 30° outward cant angle), a staggered, conventional three-tail arrangement, and a four-tail arrangement (the two-tail V-shaped configuration plus horizontal tails). No attempt was made to optimize these tail configurations for low drag, and the axial position of the tails was not a variable in this investigation. Descriptions of the individual tails are provided in figures 5(b) and 5(c). The single and twin vertical tail planforms were identical. Individual root fairings (fillers) contoured the tails to the various nozzles, with clearance gaps provided between the nozzles and horizontal tails in order to prevent fouling between the main and afterbody balances.

Twin-Jet Propulsion System

The twin-jet propulsion system is shown in figure 1. An external high-pressure air system provides a continuous flow of clean, dry air at a controlled temperature of about 70°F at the nozzles. This high-pressure air is brought into the wind-tunnel main support strut where it is divided into two separate flows and passed through remotely operated flow-control valves. These valves are used to balance the total pressure in each nozzle.

The divided compressed airflows are piped through the wingtip support booms, through the wings, and into the flow-transfer bellows assemblies (fig. 1(a)). The air in each supply pipe is discharged perpendicularly to the model axis through eight sonic nozzles equally spaced around the supply pipe. This method is designed to eliminate any transfer of axial momentum as the air is passed from the nonmetric to the metric portion of the model. Two flexible metal bellows are used as seals and serve to compensate for the axial forces caused by pressurization (fig. 6). The cavity between the supply pipe and bellows is vented to the model internal pressure. The divided airflow is then passed through the tail pipes into the transition sections and then into the exhaust nozzles. In the nonaxisymmetric nozzle configurations, a splitter fairing helped transition the airflow from the two instrumentation sections to the single exhaust nozzle.

Instrumentation

Forces and moments on the metric portions of the model were measured by two six-component strain-gauge balances. The main balance measured forces and moments resulting from the nozzle gross thrust and the external flow field over the model aft of FS 44.75. The afterbody balance measured forces and moments resulting from the external flow field over the afterbody and empennage surfaces from FS 48.25 to FS 66.25. This tandem balance arrangement allows the separation of model component forces for data analysis.

Five external seal static pressures were measured in each of the seal gaps at the first two metric breaks (FS 44.75 and FS 48.25), where the orifices were spaced about the right side of the model perimeter. An additional six orifices, positioned about the model perimeter, measured the seal gap pressures at the third metric break (FS 66.25). At each of the breaks, the orifices were located on the upstream body. In addition to these external pressures, two internal pressures were measured at each metric seal. These pressure measurements were then used to correct measured axial force and pitching moment for pressure-area tares as discussed in the appendix.

A limited number of static-pressure orifices were located on the afterbody and nozzle boattails. Results from these static-pressure orifices (because of the limited number) were used primarily as a diagnostic tool and as supporting information to the balance force and moment measurements; hence, exact orifice locations are not defined herein. However, whenever static-pressure data are plotted, the figures contain sketches showing relative orifice locations.

A critical-flow multiple venturi system was used to determine weight-flow rates for the nozzles and is described in detail in reference 10. Instrumentation in each nozzle consisted of a stagnation-temperature probe and a total-pressure rake. Each rake contained five total-pressure probes (fig. 1(b)).

All pressures were measured with individual pressure transducers. Data obtained during each tunnel run were recorded on magnetic tape and were reduced with standard data reduction procedures. For each data point, 50 samples of data were recorded over a period of 5 sec and were averaged.

Tests

This investigation was conducted in the Langley 16-Foot Transonic Tunnel at Mach numbers from 0.60 to 1.20 and at angles of attack from $-3°$ to $9°$. Nozzle pressure ratio was varied from 1 (jet off) to approximately 12, depending on Mach number. The basic data were obtained by varying angle of attack at nozzle pressure ratios of 1 (jet off) and 5.6 (design pressure ratio) and varying nozzle pressure ratio at zero angle of attack. This investigation was conducted with different nozzles and empennage arrangements. Reynolds number based on the wing mean geometric chord varied from 4.4×10^6 to 5.28×10^6.

All tests were conducted with 0.10-in-wide boundary-layer transition strips consisting of No. 120 silicon carbide grit sparsely distributed in a thin film of lacquer. These strips were located 1.0 in. from the tip of the forebody nose and on both upper and lower surfaces of the wings and empennage from 5 percent of the root chord to 10 percent of the tip chord.

Presentation of Results

The results of this investigation are presented in both tabular and plotted form. Table 1 is an index to the basic data presented in tables 2 to 24. The computer symbols appearing in these tables are defined in the section "Symbols" with their corresponding mathematical symbols that are described in the appendix. Note that NPR < 1.0 for jet-off data at $M = 1.20$ since total pressures measured in the nozzle cavity are reduced by flow expanding over the nozzle boattails. Plotted basic and summary data for selected conditions are presented in figures 7 to 24 as follows:

Discussion

Nozzle Static Internal Performance

Nozzle internal thrust ratio F_A/F_i, resultant thrust ratio F_r/F_i, discharge coefficient w_p/w_i, and resultant thrust vector angle δ are presented in figure 7 as a function of NPR. Figure 7(a) compares the performance of the unvectored ($\delta_v = 0°$) nozzles, and figures 7(b) and 7(c) show the effect of design thrust vector angle on internal performance for the medium-aspect-ratio (MED) and high-aspect-ratio (HI) nozzles, respectively. Note that the design NPR of 5.6 was not reached at static conditions.

As seen in figure 7(a), the four unvectored nozzles had levels of discharge coefficient, thrust ratio, and resultant thrust ratio all within about 1 percent of each other. As expected (see ref. 11), discharge coefficient decreased slightly with increasing nozzle aspect ratio. This effect is believed to result from a higher scrubbing drag due to the increased throat perimeter (surface area) as the throat aspect ratio increased.

As expected, at NPR > 3.0 the resultant thrust vector angle was small (less than 1°) and nearly

independent of NPR, although fairly large angles (up to 6.3°) were measured at NPR = 2.0. This phenomenon has been observed before (see ref. 12) and is probably caused by asymmetric internal flow separation.

For the MED nozzle (fig. 7(b)), the measured resultant thrust vector angle exceeded the design thrust vector angle of 20° only at NPR = 2.0, with δ decreasing below 20° with increasing NPR. Vectoring the nozzle also incurred a 2-percent loss in discharge coefficient, a loss noted previously on similar nozzle configurations (ref. 13) that is caused by changes in the location and physical geometry of the nozzle throat. As shown in figure 7(c) the HI nozzle vectoring configurations provided slightly more flow turning than the MED nozzle. Values of resultant thrust vector angle δ were generally within 2° of the geometric vector angle δ_v at values of NPR near the design NPR (5.6) for all configurations. The $\delta_v = 10°$ configuration provided no discharge coefficient penalty, whereas the $\delta_v = 20°$ configurations had a 2-percent penalty (figs. 7(b) and 7(c)) relative to the unvectored nozzle cases. None of the vectored configurations experienced significant losses in resultant thrust ratio (less than 1 percent compared with the unvectored nozzles), indicating that the majority of the exhaust flow turning occurred subsonically where turning losses are small (ref. 13).

Basic Data

The basic aeropropulsive data obtained during this investigation are presented in figures 8 to 20 for the various configurations tested. Thrust has been removed from these data with the use of procedures outlined in the appendix; hence the results represent aerodynamic and/or thrust-induced aerodynamic characteristics of the entire aft end. Two types of data presentation are made to illustrate the effects of nozzle pressure ratio and angle of attack. First, the variation of aft-end aerodynamic lift, drag, and pitching-moment coefficients with angle of attack is presented in figures 8 to 14 at NPR = 1 (jet off) and 5.6 (design pressure ratio). Second, the variation of aft-end, afterbody, and nozzle aerodynamic drag coefficients with nozzle pressure ratio at $\alpha = 0°$ is presented in figures 15 to 20. Note that all basic data, including total (thrust included) and thrust-removed coefficients, are presented in tables 2 to 24.

Figures 8 to 14 present aft-end aerodynamic characteristics at nozzle pressure ratios of 1 and 5.6 (design pressure ratio). These data show that NPR effects on lift and pitching-moment coefficients are usually negligible; only drag coefficient is affected by jet operation. The variation of aft-end lift coefficient with angle of attack is generally nonlinear. This result is typical for partially metric, afterbody propulsion model data (e.g., see refs. 8 and 14) and is due to the changing wing downwash characteristics on the afterbody and empennage in the transonic speed range. Figure 8 shows that the tails-off, unvectored nozzle configurations have almost identical aerodynamic characteristics, which are nearly independent of angle of attack, for subsonic Mach numbers. At $M = 1.20$ and NPR = 5.6, the AXI nozzle clearly has lower drag than the nonaxisymmetric nozzles throughout the angle-of-attack range. Figures 9 to 13 show that for positive angles of attack, increasing the number of tails generally increases the aft-end lift coefficient at subsonic Mach numbers, and the minimum aft-end drag in all cases. Zero pitching-moment coefficient generally occurs at or near $C_L = 0$, regardless of tail configuration for all unvectored nozzle configurations.

The effects of thrust vectoring on the tails-off, aft-end aerodynamic characteristics of the HI nozzle configuration are presented in figure 14. As expected (see ref. 15), thrust vectoring increases lift at all Mach numbers. Examination of the jet-off lift coefficient increments indicates that a portion of the lift increase associated with vectoring the nozzle is produced by deflection of the vector flap into the free-stream flow. This jet-off lift increment varies with both Mach number and angle of attack, accounting for up to approximately 80 percent of the total lift increment due to thrust vectoring. Also, as expected, positive vector angles produced a nose-down pitching moment.

The variation of aft-end drag coefficient with NPR is shown in figures 15 to 20. As will be discussed in the appendix (eq. (A8)), aft-end drag is the sum of afterbody drag and nozzle drag. Generally, the variation of aft-end drag with nozzle pressure ratio results from thrust-induced effects occurring on the nozzles rather than on the afterbody. In fact, afterbody drag coefficient $C_{D,\mathrm{aft}}$ is nearly independent of NPR, indicating that either the pressure variations resulting from NPR changes do not feed forward onto the afterbody or that the aft-facing area on the afterbody is so small (because of the small amount of afterbody closure) that any NPR-induced pressure changes occurring on these surfaces produce very little change in drag.

The variations of aft-end drag (and corresponding nozzle drag) generally follow expected trends noted in references 7 and 14 for the unvectored configurations. Aft-end drag for the unvectored nozzles appears to decrease with initial jet operation (NPR between 1 and 2). During this study no data were taken in this range of nozzle pressure ratio (between 1

and 2); however, results from previous studies (refs. 7 and 14) noted that a drag minimum often occurred. When the jet is not operating, external flow must expand over the nozzle boattail to fill in the large base region behind the nozzle. This expansion acts to lower pressures on the nozzle boattail and thus causes increased drag on the nozzle. Upon initial operation of the jet, this expansion of the external flow is reduced, thus increasing boattail pressures and ultimately reducing drag. Further increases in NPR from approximately 2.0 to the design NPR (in this case, 5.6) result in some external flow being entrained by the jet-exhaust flow. This entrainment accelerates the external flow around the nozzle boattails, thus reducing boattail pressures and again increasing drag. Once the design NPR is reached, nozzle internal flow becomes underexpanded and the flow must expand externally. The jet plume begins to enlarge, thus providing some blockage of the external flow in the vicinity of the nozzle exit. Because this plume blockage then decelerates the external flow, nozzle boattail pressures are increased and drag is decreased.

Exceptions to these general aft-end drag/NPR trends occurred at subsonic speeds for both the medium- (fig. 17) and high-aspect-ratio nozzles (figs. 18 and 19). The largest differences occurred on the HI nozzle vectored configurations where an additional (and unexpected) decrease and increase in drag occurred at values of NPR between 2 and 4. Reasons for the deviation are believed to result from the fact that at NPR $= 2$ the exhaust flow was significantly overturned as noted in the discussion of nozzle static performance. As a result, upper nozzle boattail pressures, as shown in figure 21(a), decreased and lower nozzle boattail pressures increased. Since the lower vectored nozzle flap had little axial projected area relative to that of the upper flap, it is assumed that the increased drag on the upper flap dominated the overall nozzle drag trends. As NPR increased to NPR ≥ 3.0, flow overturning decreased and resultant thrust vector angle levels generally became nearly independent of NPR; this resulted in the more conventional aft-end drag/NPR relationships discussed previously.

Variations of aft-end drag with NPR for the unvectored MED and HI nozzle configurations (figs. 17 and 18) also generally deviate from the expected trends at subsonic speeds. Again the NPR $= 2.0$ point is believed to be the exception. This time, however, exhaust flow was being turned upward and resultant thrust vector angles of -5° and -6.3° were measured even though $\delta_v = 0^\circ$. This upward-deflection exhaust flow appears to provide some blockage of the free-stream flow on the external upper nozzle surfaces (thus increasing nozzle boattail pressures as shown in fig. 21(b)). Conversely, the external flow on the lower nozzle-flap boattail appeared to accelerate (thus reducing lower flap boattail pressures). The net result is believed to be an overall increase in aft-end drag at NPR $= 2$ (relative to the aft-end drag level where $\delta = 0^\circ$).

In general, nozzle drag was only a small contributor to aft-end drag at subsonic speeds. In fact, the unvectored nozzle configurations (the MED and HI nozzles, especially) often had negative drag coefficients, a result indicating that favorable positive pressures on the nozzle boattails are acting to reduce aft-end drag. Nozzle drag at supersonic speeds was always positive and generally accounted for between 40 and 70 percent of the aft-end drag, and afterbody drag accounted for the remainder.

The addition of empennage surfaces resulted in increased aft-end drag, as expected from reference 14. Drag increased as the number of tails increased. Most of this drag increase was measured on the afterbody, although tails often had a significant effect on nozzle drag as well.

Figure 22 summarizes the data presented in figures 15 to 18 at the design nozzle pressure ratio of 5.6. Note that this nozzle pressure ratio is a realistic engine operating condition only at $M = 0.90$. At subsonic Mach numbers the MED nozzle, with equal and moderate boattail angles ($\beta_c = 13.5^\circ$), provided the lowest drag of all nonaxisymmetric nozzle configurations and was competitive with, or better than, the twin axisymmetric nozzles with smaller boattail angles ($\beta_c = 10^\circ$). This effect was true regardless of empennage arrangement. As noted previously, nozzle drag was consistently lower on the MED nozzle than on either the LO or HI nozzles.

At supersonic speeds the AXI nozzles clearly provided the lowest drag of all nozzle configurations while the HI nozzle generally had the highest drag. Even though the area distribution for all nozzle configurations was nearly identical, the smaller boattail angles associated with the axisymmetric nozzles apparently provided more favorable pressures on the nozzles and perhaps even on the interfairing region at supersonic speeds. In all cases the MED nozzle had the lowest nozzle drag of the nonaxisymmetric nozzles (but it often had higher afterbody drag) so that differences in C_D were generally small (within 0.0013).

Effect of Tail Configuration

The effects of nozzle pressure ratio on individual tail interference drag increments at $\alpha = 0^\circ$ are presented in figure 23 for each unvectored configuration investigated. These results are summarized in figure 24 at design pressure ratio (NPR $= 5.6$). Tail

interference increments are that portion of the complete drag resulting from tail-induced interference effects (tails-on drag versus tails-off drag). These tail interference increments are expressed as the tail-induced drag on the entire aft end ($\Delta C_{D,it}$), on the afterbody ($\Delta C_{D,ia}$), and on the nozzle ($\Delta C_{D,in}$). A more detailed description of these measurements and how they are computed appears in the appendix. A negative tail interference increment indicates that the interference is favorable (tails-on drag less than tails-off drag). It should be noted that no attempt was made to optimize these tail configurations for low drag.

Tail interference effects (fig. 24) are present at all test conditions, with the tail interference drag increments increasing in magnitude with increasing subsonic Mach number. Tail interference drag on the entire aft end and on the afterbody is generally unfavorable. Tail interference drag increments on the nozzles are favorable at several conditions; however, they do not necessarily correspond to conditions discussed previously where nozzle drag was negative. The largest tail interference drag increments on the aft end and afterbody occur, as expected, at $M = 0.90$ where tail interference drag can account for almost 60 percent of the drag on the entire aft end. At subsonic Mach numbers, tail interference drag increments $\Delta C_{D,it}$ on the aft end were generally smaller for the MED nozzle than for any other nozzle configuration. However, as might be expected based on the previous discussions of aft-end drag, values of $\Delta C_{D,it}$ at $M = 1.20$ were lower for the axisymmetric nozzle configurations. The four-tail empennage arrangement provided the largest tail interference drag increment, independent of nozzle design.

Conclusions

An investigation has been conducted in the Langley 16-Foot Transonic Tunnel to determine the effects of nozzle boattail design and empennage arrangement on the aft-end aerodynamic characteristics of a twin-engine fighter-type configuration. Three nonaxisymmetric and one twin axisymmetric covergent-divergent nozzles were tested with three different tail arrangements: a two-tail V-shaped arrangement; a staggered, conventional three-tail arrangement; and a four-tail arrangement similar to that on the F-18. Tests were conducted at Mach numbers from 0.60 to 1.20 over an angle-of-attack range from -3° to 9°. Nozzle pressure ratio was varied from 1 (jet off) to approximately 12, depending on Mach number. An analysis of the results of this investigation indicated the following conclusions:

1. All four unvectored nozzles had similar internal static performance. Thrust vectoring was accomplished with no significant losses of internal static performance when compared with the unvectored nozzles.

2. At an angle of attack of 0° and subsonic Mach numbers, the medium-aspect-ratio nozzle (with equal boattail angles on the nozzle sidewalls and upper and lower flaps) had the lowest drag of any nonaxisymmetric nozzle configuration. The drag levels of the twin axisymmetric nozzle were competitive with those of the medium-aspect-ratio nozzle at subsonic Mach numbers and were clearly lower than those of the nonaxisymmetric nozzles at a Mach number of 1.20.

3. Unfavorable tail interference effects were present at all test conditions. Tail interference drag increments increased with increasing subsonic Mach number.

4. At a Mach number of 0.90, adverse tail interference effects accounted for a significant percentage of drag on the entire aft end, in some cases nearly 60 percent.

5. At subsonic Mach numbers the medium-aspect-ratio nozzle configurations generally had the least unfavorable tail interference drag increments, and the four-tail configuration generally produced the most unfavorable interference drag increments at all Mach numbers.

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March 26, 1987

Appendix

Data Reduction and Calibration Procedure

Calibration Procedure

The main balance measured the combined forces and moments due to nozzle gross thrust and the external flow field of that portion of the model aft of FS 44.75. The tandem shell balance measured forces and moments due to the external flow field exerted over the afterbody and tails between FS 48.25 and FS 66.25.

Force and moment interactions exist between the flow-transfer bellows system (fig. 6) and the main force balance because the centerline of this balance was below the jet centerline (fig. 1(b)). Consequently, single and combined loadings of normal and axial force and pitching moment were made with and without the jets operating with Stratford choke calibration nozzles. These calibrations were performed with the jets operating because this condition gives a more realistic effect of pressurizing the bellows than capping the nozzles and pressurizing the flow system. Thus, in addition to the usual balance-interaction corrections applied for a single force balance under combined loads, another set of interactions were made to the data from this investigation to account for the combined loading effect of the main balance with the bellows system. These calibrations were performed over a range of expected normal forces and pitching moments. Note that this procedure is not necessary for the afterbody forces because the flow system is not bridged by the tandem shell balance.

Data Adjustments

In order to achieve desired axial-force terms, the axial forces measured by both force balances must also be corrected for pressure-area tare forces acting on the model and the main balance must be corrected for momentum tare forces caused by flow in the bellows. The external seal and internal pressure forces on the model were obtained by multiplying the difference between the average pressure (external seal or internal pressures) and free-stream static pressure by the affected projected area normal to the model axis. The momentum tare force was determined from calibrations with the ASME nozzle prior to the wind-tunnel investigation.

Axial force minus thrust was computed from the main balance axial force with the following relationship:

$$F_A - F_j = F_{A,\mathrm{Mbal}} + (\bar{p}_{es,1} - p_\infty)\,(A_{mb,1} - A_{\mathrm{seal},1}) + (\bar{p}_i - p_\infty)A_{\mathrm{seal},1} - F_{A,\mathrm{mom}} + D_f \tag{A1}$$

where $F_{A,\mathrm{Mbal}}$ includes all pressure and viscous forces, internal and external, on both the afterbody and thrust system. The second and third terms account for the forward seal rim and interior pressure forces, respectively. The internal pressure at any given set of test conditions was uniform throughout the inside of the model; thus, no cavity flow was indicated. The momentum tare force $F_{A,\mathrm{mom}}$ is a momentum tare correction with jets operating and is a function of the average bellows internal pressure that is a function of the internal chamber pressure in the supply pipes just ahead of the sonic nozzles (fig. 6). Although the bellows were designed to minimize momentum and pressurization tares, small bellows tares still exist with the jet on. These tares result from small pressure differences between the ends of the bellows when internal velocities are high and also from small differences in the forward and aft bellows spring constants when the bellows are pressurized. The last term D_f (eq. (A1)) is the friction drag of the section from FS 44.75 to FS 48.25. A friction drag coefficient of 0.0004 was applied at all Mach numbers.

Afterbody axial force is computed from a similar relationship as follows:

$$\begin{aligned} F_{\mathrm{aft}} = F_{A,\mathrm{Sbal}} &+ (\bar{p}_{es,2} - p_\infty)(A_{mb,1} - A_{\mathrm{seal},2}) \\ &+ (\bar{p}_i - p_\infty)A_{\mathrm{seal},2} + (\bar{p}_{es,3} - p_\infty)(A_{mb,2} - A_{\mathrm{seal},3}) \\ &+ (\bar{p}_i - p_\infty)A_{\mathrm{seal},3} \end{aligned} \tag{A2}$$

Since both balances are offset from the model centerline, similar adjustments are made to the pitching moments measured by both balances. These adjustments are necessary because both the pressure area and bellows momentum tare forces are assumed to act along the model centerline. The pitching-moment tare is determined by multiplying the tare force by the appropriate moment arm and subtracting the value from the measured pitching moments.

Model Attitude

The adjusted forces and moments measured by both balances were transferred from the body axis (which lies in the horizontal tail chord plane) of the metric portion of the model to the stability axis. The attitude of the nonmetric forebody relative to gravity was determined from a calibrated attitude indicator located in the model nose. Angle of attack α, which is the angle between the afterbody centerline and the relative wind, was determined by applying terms for afterbody deflection, caused when the model and balance bent under aerodynamic load, and by a flow angularity term to the angle measured by the attitude indicator. The flow angularity adjustment was 0.1°, which is the average angle measured in the Langley 16-Foot Transonic Tunnel.

Ideal Thrust

The ideal isentropic gross thrust of each nozzle can also be determined if the weight-flow rate for each nozzle is known. The effective discharge coefficients of the eight sonic nozzles (fig. 6) forward of each of the nozzle tail pipes were determined and used for measuring mass flow.

The total ideal isentropic gross thrust or exhaust jet momentum for both nozzles is

$$F_i = w_p \left\{ \frac{RT_{t,j}}{g} \frac{2\gamma}{\gamma - 1} \left[1 - \left(\frac{p_\infty}{p_{t,j}} \right)^{\frac{\gamma-1}{\gamma}} \right] \right\}^{1/2} \tag{A3}$$

where w_p is the weight-flow rate measured by the critical flow multiple venturis and $p_{t,j}$ is the average jet stagnation pressure.

Thrust-Removed Characteristics

The resulting force and moment coefficients (including thrust components) from the main balance include total lift coefficient $C_{L,t}$, drag-minus-thrust coefficient $C_{(D-F)}$, and total pitching-moment coefficient $C_{m,t}$. Force and moment coefficients from the tandem shell balance are afterbody (plus tails) lift coefficient $C_{L,\mathrm{aft}}$, afterbody drag coefficient $C_{D,\mathrm{aft}}$, and afterbody pitching-moment coefficient $C_{m,\mathrm{aft}}$.

Thrust-removed aerodynamic force and moment coefficients for the entire model were obtained by determining the components of thrust in axial force, normal force, and pitching moment and subtracting these values from the measured total (aerodynamic plus thrust) forces and moments. These thrust components at forward speeds were determined from measured static data and were a function of the free-stream static and dynamic pressure. Thrust-removed aerodynamic coefficients are

$$C_L = C_{L,t} - \text{Jet lift coefficient} \tag{A4}$$

$$C_D = C_{(D-F)} + \text{Thrust coefficient} \tag{A5}$$

$$C_m = C_{m,t} - \text{Jet pitching-moment coefficient} \tag{A6}$$

Nozzle coefficients are obtained by simply combining the measured results from both force balances as follows:

$$C_{L,n} = C_L - C_{L,\mathrm{aft}} \tag{A7}$$

$$C_{D,n} = C_D - C_{D,\mathrm{aft}} \tag{A8}$$

$$C_{m,n} = C_m - C_{m,\mathrm{aft}} \tag{A9}$$

Tail Interference Terms

Vertical and horizontal tail drag was defined as the sum of form drag plus skin-friction drag for $M \leq 0.90$ and wave drag plus skin-friction drag for $M > 1.00$. The subsonic form factors for the tails were calculated with the equation

$$\text{Form factor} = 1 + 1.44(t/c) + 2(t/c)^2 \tag{A10}$$

where t/c denotes the thickness-chord ratio. The individual fairings required for each tail location were also included in the skin-friction and wave-drag calculations. Values of $C_{D,\text{tails}}$ are given in table 25.

The tail interference terms used in this report are consistent with those used in references 8 and 14. The total empennage interference increment on the aft end was determined from

$$\Delta C_{D,it} = (C_D)_{\text{tails on}} - (C_D)_{\text{tails off}} - C_{D,\text{tails}} \tag{A11}$$

where $(C_D)_{\text{tails on}}$ is the measured total aft-end drag for a given configuration, $(C_D)_{\text{tails off}}$ is the measured aft-end drag for the same afterbody-nozzle combination with the tails removed, and $C_{D,\text{tails}}$ is the computed value of tail drag as discussed previously. Hence, this total tail interference increment includes the interference effects of one tail surface on another, of the afterbody-nozzle combination on the tail surfaces, and of the tail surface on the afterbody-nozzle combination. It also includes drag increments associated with misalignment of the tail surfaces with the afterbody flow field. The empennage interference effects on the nozzles alone were found from the following equation:

$$\Delta C_{D,in} = (C_{D,n})_{\text{tails on}} - (C_{D,n})_{\text{tails off}} \tag{A12}$$

where the nozzle drags are obtained from equation (A8). This empennage interference increment, then, is the result of changes in nozzle external pressure distributions resulting from adding tail surfaces to an afterbody-nozzle configuration. The tail interference increment on the afterbody alone was then defined to be the difference between the tail interference increments on the total aft end and the nozzles alone or

$$\Delta C_{D,ia} = \Delta C_{D,it} - \Delta C_{D,in} \tag{A13}$$

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Table 1. Index to Basic Data Tables

Table	Nozzle	Tail configuration	δ_v, deg
2	AXI	Off	0
3		2	
4		3	
5	↓	4	
6	LO	Off	
7		2	
8		3	
9	↓	4	
10	MED	Off	
11		2	
12		3	
13	↓	4	
14	HI	Off	
15		2	
16		3	
17	↓	4	↓
18	MED	Off	20
19	HI	Off	10
20		2	
21		3	
22		4	↓
23		Off	20
24	↓	2	20

[a]Numbers refer to number of tails in empennage arrangement.

Table 2. Aeropropulsive Characteristics for AXI Nozzle With Tails Off

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
1.201	.85	.00	-.0034	.0164	.0016	-.0034	.0164	.0016	-.0042	.0052	.0043	.0008	.0111	-.0027
1.199	1.98	.02	-.0027	-.0015	.0014	-.0023	.0145	-.0005	-.0041	.0053	.0041	.0017	.0092	-.0046
1.200	4.03	.01	-.0022	-.0333	.0038	-.0019	.0145	-.0008	-.0040	.0053	.0040	.0022	.0093	-.0049
1.198	5.62	.01	-.0027	-.0587	.0069	-.0032	.0144	.0000	-.0041	.0053	.0040	.0009	.0091	-.0040
1.199	8.05	.01	-.0020	-.0978	.0100	-.0035	.0142	-.0004	-.0038	.0053	.0038	.0003	.0089	-.0042
1.200	10.05	.00	-.0017	-.1301	.0128	-.0041	.0137	-.0005	-.0039	.0053	.0039	-.0002	.0085	-.0043
1.200	10.99	-.01	-.0017	-.1454	.0142	-.0044	.0136	-.0005	-.0038	.0053	.0037	-.0006	.0083	-.0042
1.200	12.01	-.01	-.0008	-.1619	.0150	-.0040	.0133	-.0011	-.0037	.0053	.0037	-.0002	.0081	-.0047
1.199	.65	.02	-.0032	.0168	.0014	-.0032	.0168	.0014	-.0040	.0053	.0040	.0008	.0115	-.0026
1.200	.79	6.02	.0357	.0274	-.0363	.0357	.0274	-.0363	.0231	.0088	-.0220	.0126	.0186	-.0143
1.200	2.00	6.02	.0376	.0069	-.0339	.0363	.0232	-.0358	.0232	.0089	-.0222	.0131	.0143	-.0136
1.201	4.03	5.00	.0406	-.0247	-.0305	.0360	.0228	-.0351	.0233	.0089	-.0222	.0128	.0140	-.0129
1.201	5.57	6.01	.0427	-.0495	-.0271	.0347	.0221	-.0339	.0234	.0089	-.0223	.0113	.0132	-.0116
1.200	8.07	6.01	.0459	-.0901	-.0217	.0327	.0213	-.0321	.0233	.0089	-.0222	.0094	.0124	-.0099
1.202	10.04	6.00	.0490	-.1217	-.0181	.0317	.0205	-.0313	.0234	.0088	-.0223	.0084	.0117	-.0090
1.200	11.04	6.01	.0505	-.1382	-.0162	.0311	.0202	-.0308	.0232	.0088	-.0221	.0079	.0114	-.0088
.598	1.02	.02	-.0014	.0054	.0002	-.0014	.0054	.0002	-.0019	.0046	.0011	.0005	.0008	-.0009
.601	1.99	-.01	-.0002	-.0593	.0062	.0014	.0056	-.0012	-.0019	.0044	.0012	.0033	.0013	-.0024
.600	3.02	.00	.0009	-.1214	.0115	.0021	.0069	-.0019	-.0020	.0044	.0012	.0040	.0025	-.0031
.600	4.00	.00	.0013	-.1834	.0176	.0029	.0057	-.0006	-.0021	.0044	.0015	.0050	.0013	-.0021
.600	5.58	-.01	.0017	-.2844	.0271	-.0003	.0046	-.0002	-.0022	.0043	.0017	.0019	.0003	-.0019
.600	6.00	-.01	.0022	-.3105	.0296	-.0004	.0050	-.0001	-.0023	.0043	.0018	.0019	.0007	-.0019
.599	1.02	.01	.0012	.0051	-.0006	.0012	.0051	-.0006	-.0024	.0045	.0019	.0036	.0006	-.0025
1.198	.85	-2.97	-.0246	.0199	.0233	-.0246	.0199	.0233	-.0175	.0064	.0160	-.0071	.0135	.0072
1.201	.84	.00	-.0027	.0169	.0013	-.0027	.0169	.0013	-.0038	.0053	.0037	.0011	.0116	-.0024
1.199	.83	3.02	.0190	.0211	-.0212	.0190	.0211	-.0212	.0105	.0060	-.0093	.0085	.0151	-.0119
1.200	.81	5.99	.0380	.0265	-.0384	.0381	.0265	-.0384	.0252	.0084	-.0237	.0129	.0181	-.0148
1.200	.75	9.01	.0500	.0350	-.0499	.0501	.0350	-.0499	.0347	.0125	-.0350	.0154	.0225	-.0149
1.201	.84	-3.00	-.0261	.0201	.0242	-.0261	.0201	.0242	-.0178	.0064	.0163	-.0083	.0136	.0079
1.201	5.59	-2.99	-.0295	-.0558	.0316	-.0263	.0164	.0248	-.0177	.0064	.0162	-.0086	.0100	.0086
1.203	5.59	.00	-.0012	-.0576	.0051	-.0017	.0145	-.0017	-.0035	.0053	.0033	.0018	.0091	-.0050
1.204	5.64	3.01	.0230	-.0558	-.0138	.0186	.0167	-.0206	.0108	.0061	-.0099	.0078	.0107	-.0107
1.198	5.57	6.00	.0457	-.0507	-.0304	.0377	.0212	-.0372	.0252	.0084	-.0237	.0125	.0128	-.0135
1.200	5.59	9.00	.0614	-.0422	-.0413	.0496	.0292	-.0481	.0349	.0125	-.0351	.0148	.0167	-.0130
1.202	.84	-.01	-.0033	.0172	.0014	-.0033	.0172	.0014	-.0040	.0054	.0038	.0006	.0118	-.0025
.901	1.06	.00	-.0035	.0052	.0015	-.0035	.0052	.0015	-.0034	.0059	.0022	-.0001	-.0008	-.0007
.900	1.98	.01	-.0018	-.0236	.0030	-.0012	.0050	-.0003	-.0031	.0055	.0019	.0020	-.0005	-.0021
.901	3.01	.01	-.0024	-.0511	.0065	-.0018	.0056	.0005	-.0032	.0055	.0021	.0014	.0001	-.0015
.900	4.01	.02	-.0018	-.0790	.0088	-.0011	.0054	.0007	-.0032	.0055	.0019	.0021	-.0001	-.0013
.901	5.59	.00	-.0015	-.1236	.0130	-.0025	.0049	.0009	-.0031	.0055	.0018	.0006	-.0007	-.0009
.899	7.74	.00	-.0008	-.1856	.0186	-.0033	.0048	.0009	-.0030	.0054	.0017	-.0003	-.0006	-.0008
.898	1.06	-.01	-.0013	.0053	.0007	-.0013	.0053	.0007	-.0032	.0059	.0020	.0019	-.0006	-.0013
.901	1.05	6.02	.0038	.0058	-.0030	.0038	.0058	-.0030	-.0039	.0053	.0037	.0077	.0005	-.0067

Table 2. Continued

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
.899	2.03	6.01	.0065	-.0246	-.0009	.0041	.0051	-.0042	-.0032	.0049	.0030	.0074	.0002	-.0072
.900	3.03	6.01	.0091	-.0510	.0017	.0037	.0059	-.0043	-.0034	.0050	.0031	.0070	.0009	-.0073
.900	4.01	6.01	.0117	-.0787	.0046	.0036	.0054	-.0035	-.0033	.0050	.0030	.0069	.0004	-.0065
.900	5.67	6.01	.0166	-.1252	.0091	.0020	.0047	-.0032	-.0034	.0050	.0031	.0053	-.0003	-.0063
.899	8.06	6.01	.0234	-.1940	.0164	-.0002	.0042	-.0021	-.0032	.0049	.0029	.0030	-.0007	-.0050
.900	8.87	5.99	.0255	-.2164	.0189	-.0010	.0041	-.0016	-.0033	.0048	.0031	.0024	-.0007	-.0047
.903	1.06	-3.01	-.0032	.0054	.0012	-.0032	.0054	.0012	-.0013	.0059	-.0002	-.0019	-.0005	.0014
.903	1.06	-.01	-.0015	.0053	.0009	-.0015	.0053	.0009	-.0033	.0059	.0021	.0018	-.0006	-.0012
.898	1.06	3.02	-.0006	.0052	.0008	-.0006	.0052	.0008	-.0042	.0055	.0037	.0036	-.0004	-.0029
.899	1.05	5.99	.0022	.0054	-.0022	.0023	.0054	-.0022	-.0037	.0053	.0036	.0060	.0001	-.0058
.901	1.06	9.00	.0114	.0072	-.0092	.0115	.0072	-.0092	-.0009	.0059	.0025	.0124	.0013	-.0116
.901	1.06	-3.01	-.0035	.0051	.0014	-.0035	.0051	.0014	-.0015	.0059	.0000	-.0020	-.0008	.0014
.900	5.61	-3.00	-.0098	-.1248	.0144	-.0040	.0044	.0022	-.0017	.0055	.0002	-.0023	-.0011	.0020
.901	5.64	.00	-.0018	-.1254	.0133	-.0028	.0044	.0010	-.0031	.0056	.0018	.0003	-.0011	-.0008
.900	5.61	3.02	.0068	-.1247	.0121	-.0009	.0044	-.0001	-.0040	.0052	.0033	.0031	-.0008	-.0034
.901	5.61	5.98	.0163	-.1237	.0090	.0020	.0046	-.0031	-.0035	.0050	.0031	.0055	-.0004	-.0063
.901	5.61	8.99	.0326	-.1210	.0017	.0115	.0064	-.0104	-.0004	.0056	.0019	.0120	.0008	-.0124
.801	1.04	.00	-.0017	.0050	.0013	-.0017	.0050	.0013	-.0027	.0050	.0018	.0010	.0000	-.0005
.801	2.02	.01	-.0012	-.0324	.0046	-.0003	.0046	.0004	-.0025	.0047	.0017	.0022	-.0001	-.0013
.800	3.06	.00	-.0012	-.0678	.0082	-.0005	.0057	.0005	-.0027	.0048	.0019	.0022	.0009	-.0014
.800	4.03	.00	-.0008	-.1024	.0112	.0000	.0051	.0009	-.0026	.0048	.0017	.0026	.0003	-.0008
.800	5.65	-.01	-.0011	-.1605	.0169	-.0023	.0043	.0014	-.0025	.0047	.0016	.0002	-.0005	-.0002
.800	6.03	-.01	-.0007	-.1744	.0180	-.0022	.0044	.0012	-.0024	.0047	.0015	.0002	-.0003	-.0003
.800	7.01	-.01	-.0009	-.2095	.0215	-.0033	.0044	.0016	-.0025	.0047	.0016	-.0008	-.0004	.0000
.798	1.04	.00	-.0017	.0051	.0013	-.0017	.0051	.0013	-.0026	.0050	.0017	.0009	.0001	-.0004
.799	1.04	-3.01	-.0046	.0055	.0029	-.0046	.0055	.0029	-.0039	.0052	.0024	-.0007	.0004	.0004
.801	1.04	.02	-.0012	.0051	.0011	-.0012	.0051	.0011	-.0025	.0050	.0017	.0014	.0001	-.0006
.800	1.04	3.03	.0020	.0054	-.0008	.0020	.0054	-.0008	-.0016	.0048	.0016	.0037	.0006	-.0024
.802	1.04	6.00	.0072	.0065	-.0067	.0072	.0065	-.0067	.0006	.0051	-.0005	.0067	.0015	-.0061
.793	1.04	9.02	.0115	.0074	-.0089	.0116	.0074	-.0089	.0030	.0056	-.0022	.0086	.0018	-.0068
.799	5.61	-3.02	-.0138	-.1590	.0199	-.0064	.0046	.0045	-.0039	.0050	.0025	-.0025	-.0003	.0020
.801	5.63	.02	-.0012	-.1596	.0169	-.0025	.0042	.0015	-.0025	.0048	.0017	.0000	-.0006	-.0002
.799	5.62	3.02	.0116	-.1596	.0138	.0018	.0045	-.0017	-.0012	.0046	.0011	.0030	-.0001	-.0028
.800	5.63	6.02	.0255	-.1577	.0077	.0071	.0055	-.0077	.0011	.0049	-.0012	.0060	.0006	-.0066
.799	5.57	8.98	.0384	-.1541	.0045	.0119	.0067	-.0109	.0034	.0055	-.0028	.0085	.0012	-.0081
.798	1.04	.02	-.0019	.0052	.0013	-.0019	.0052	.0013	-.0026	.0050	.0017	.0007	.0002	-.0004
.601	1.02	-.02	-.0015	.0052	.0010	-.0015	.0052	.0010	-.0023	.0046	.0017	.0008	.0006	-.0007
.601	2.03	-.02	-.0009	-.0618	.0075	.0007	.0043	.0000	-.0017	.0044	.0010	.0025	-.0001	-.0010
.600	3.07	-.01	-.0007	-.1251	.0134	.0006	.0064	-.0003	-.0019	.0044	.0013	.0025	.0019	-.0016
.600	4.00	.00	-.0002	-.1835	.0188	.0014	.0053	-.0004	-.0018	.0044	.0012	.0032	.0009	-.0015
.601	5.65	-.01	.0002	-.2887	.0290	-.0019	.0039	.0014	-.0024	.0044	.0018	.0004	-.0005	-.0004
.599	5.99	-.01	.0002	-.3116	.0312	-.0025	.0042	.0015	-.0023	.0044	.0018	-.0002	-.0002	-.0003
.597	1.02	-3.01	-.0039	.0052	.0025	-.0039	.0052	.0025	-.0037	.0047	.0024	-.0002	.0005	.0001

Table 2. Concluded

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
.597	1.02	.01	-.0003	.0048	.0009	-.0003	.0048	.0009	-.0020	.0045	.0014	.0017	.0003	-.0005
.600	1.02	2.98	.0029	.0054	-.0008	.0029	.0054	-.0008	-.0004	.0045	.0005	.0033	.0009	-.0013
.599	1.02	6.01	.0107	.0069	-.0094	.0108	.0069	-.0094	.0029	.0049	-.0029	.0079	.0019	-.0065
.598	1.02	9.02	.0129	.0081	-.0105	.0129	.0081	-.0105	.0049	.0055	-.0045	.0080	.0025	-.0060
.599	1.02	-3.00	-.0052	.0053	.0030	-.0052	.0053	.0030	-.0037	.0047	.0024	-.0015	.0005	.0005
.602	5.62	-3.02	-.0191	-.2850	.0308	-.0059	.0044	.0035	-.0037	.0046	.0024	-.0023	-.0002	.0012
.598	5.63	.01	-.0003	-.2900	.0293	-.0025	.0037	.0016	-.0016	.0044	.0010	-.0008	-.0007	.0006
.599	5.59	3.01	.0187	-.2856	.0262	.0014	.0042	-.0012	.0000	.0043	.0000	.0014	-.0002	-.0011
.598	5.59	5.98	.0405	-.2840	.0191	.0081	.0053	-.0083	.0029	.0047	-.0029	.0052	.0005	-.0054
.598	5.62	8.99	.0597	-.2830	.0171	.0118	.0066	-.0106	.0054	.0054	-.0051	.0064	.0012	-.0056
.599	1.02	.00	-.0011	.0049	.0011	-.0011	.0049	.0011	-.0021	.0045	.0016	.0010	.0004	-.0004

Table 3. Aeropropulsive Characteristics for AXI Nozzle With Two Tails

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
1.199	.35	-.01	-.0178	.0211	.0216	-.0178	.0211	.0216	-.0165	.0100	.0225	-.0013	.0111	-.0010
1.202	1.96	.01	-.0186	.0035	.0231	-.0182	.0191	.0213	-.0173	.0100	.0237	-.0009	.0091	-.0025
1.200	3.97	-.01	-.0200	-.0276	.0284	-.0196	.0193	.0237	-.0172	.0100	.0236	-.0024	.0093	.0001
1.200	5.66	.00	-.0203	-.0546	.0317	-.0209	.0188	.0248	-.0176	.0100	.0241	-.0033	.0088	.0007
1.201	8.02	.00	-.0199	-.0923	.0349	-.0214	.0188	.0246	-.0175	.0100	.0242	-.0039	.0088	.0004
1.203	10.08	.00	-.0202	-.1254	.0383	-.0225	.0182	.0251	-.0181	.0100	.0249	-.0044	.0082	.0002
1.202	11.00	.00	-.0195	-.1403	.0391	-.0223	.0181	.0245	-.0177	.0100	.0244	-.0046	.0080	.0001
1.201	.85	.01	-.0189	.0218	.0224	-.0189	.0218	.0224	-.0173	.0101	.0237	-.0016	.0118	-.0014
1.199	.85	-2.99	-.0556	.0243	.0659	-.0556	.0243	.0659	-.0498	.0124	.0650	-.0057	.0118	.0009
1.200	.84	.03	-.0178	.0222	.0217	-.0178	.0222	.0217	-.0169	.0101	.0233	-.0009	.0120	-.0016
1.201	.82	3.01	.0181	.0237	-.0213	.0181	.0237	-.0213	.0152	.0110	-.0177	.0030	.0127	-.0036
1.201	.81	5.97	.0498	.0284	-.0576	.0498	.0284	-.0576	.0425	.0145	-.0525	.0074	.0139	-.0051
1.202	.74	8.99	.0626	.0389	-.0699	.0626	.0389	-.0699	.0504	.0191	-.0609	.0122	.0197	-.0089
1.202	.84	-2.98	-.0562	.0244	.0669	-.0563	.0244	.0669	-.0504	.0125	.0659	-.0059	.0119	.0010
1.199	5.58	-2.97	-.0613	-.0501	.0779	-.0581	.0220	.0711	-.0502	.0125	.0655	-.0079	.0096	.0055
1.202	5.70	.00	-.0179	-.0545	.0298	-.0184	.0194	.0228	-.0176	.0101	.0243	-.0009	.0093	-.0015
1.200	5.58	3.00	.0245	-.0508	-.0179	.0203	.0212	-.0247	.0150	.0110	-.0174	.0053	.0102	-.0073
1.203	5.66	5.98	.0619	-.0472	-.0565	.0537	.0255	-.0634	.0428	.0145	-.0527	.0109	.0111	-.0107
1.203	5.66	8.98	.0775	-.0374	-.0673	.0657	.0347	-.0742	.0506	.0192	-.0609	.0150	.0155	-.0133
1.200	.33	-.01	-.0184	.0223	.0229	-.0184	.0223	.0229	-.0182	.0101	.0250	-.0002	.0122	-.0021
.899	1.03	-.02	-.0127	.0097	.0127	-.0127	.0097	.0127	-.0097	.0096	.0089	-.0030	.0001	.0038
.900	1.97	.00	-.0132	-.0194	.0175	-.0125	.0089	.0143	-.0097	.0091	.0089	-.0029	-.0002	.0054
.899	3.05	-.01	-.0132	-.0480	.0205	-.0127	.0099	.0145	-.0097	.0093	.0090	-.0029	.0006	.0055
.900	4.06	-.01	-.0132	-.0762	.0236	-.0125	.0096	.0153	-.0101	.0093	.0095	-.0024	.0003	.0058
.900	5.65	-.01	-.0132	-.1214	.0283	-.0142	.0091	.0160	-.0102	.0092	.0096	-.0040	-.0002	.0064
.898	7.70	-.01	-.0122	-.1804	.0331	-.0146	.0090	.0155	-.0097	.0091	.0088	-.0049	.0000	.0067
.899	1.03	.01	-.0113	.0099	.0126	-.0113	.0099	.0126	-.0100	.0096	.0093	-.0013	.0003	.0033
.897	1.03	-3.02	-.0212	.0107	.0265	-.0212	.0107	.0265	-.0195	.0104	.0232	-.0018	.0003	.0033
.901	1.03	.00	-.0107	.0102	.0125	-.0107	.0102	.0125	-.0103	.0097	.0098	-.0005	.0005	.0027
.902	1.02	3.00	.0016	.0102	-.0043	.0016	.0102	-.0043	-.0011	.0092	-.0043	.0026	.0010	.0000
.902	1.02	6.03	.0114	.0106	-.0170	.0115	.0106	-.0170	.0063	.0091	-.0152	.0051	.0015	-.0018
.902	1.02	9.01	.0189	.0120	-.0241	.0190	.0120	-.0241	.0117	.0101	-.0209	.0072	.0019	-.0032
.900	1.03	-3.01	-.0228	.0104	.0277	-.0228	.0104	.0277	-.0198	.0105	.0239	-.0030	-.0001	.0038
.901	5.62	-2.99	-.0297	-.1196	.0419	-.0239	.0095	.0297	-.0199	.0101	.0241	-.0040	-.0006	.0055
.900	5.59	.02	-.0127	-.1196	.0281	-.0137	.0090	.0160	-.0103	.0092	.0098	-.0034	-.0002	.0061
.900	5.58	3.03	.0065	-.1197	.0109	-.0012	.0085	-.0013	-.0009	.0088	-.0044	-.0003	-.0002	.0031
.899	5.62	6.02	.0225	-.1201	-.0012	.0080	.0090	-.0135	.0070	.0088	-.0156	.0010	.0001	.0022
.903	5.66	9.02	.0415	-.1170	-.0149	.0202	.0112	-.0271	.0123	.0101	-.0220	.0078	.0012	-.0051
.799	1.04	-.01	.0031	.0079	-.0070	.0031	.0079	-.0070	.0025	.0077	-.0085	.0007	.0002	.0015
.800	1.98	-.01	.0020	-.0284	-.0017	.0028	.0077	-.0058	.0017	.0074	-.0071	.0012	.0004	.0014
.802	2.97	-.01	.0017	-.0614	.0018	.0024	.0086	-.0055	.0017	.0074	-.0073	.0006	.0012	.0017
.800	3.99	-.02	.0024	-.0980	.0046	.0033	.0080	-.0061	.0020	.0074	-.0076	.0013	.0005	.0015
.802	5.61	-.01	.0022	-.1556	.0103	.0011	.0073	-.0050	.0018	.0074	-.0074	-.0007	-.0002	.0023

Table 3. Concluded

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
.802	5.99	-.01	.0026	-.1687	.0113	.0011	.0074	-.0052	.0020	.0074	-.0077	-.0008	.0000	.0024
.799	6.99	-.01	.0028	-.2066	.0153	.0003	.0076	-.0046	.0017	.0073	-.0072	-.0014	.0002	.0026
.798	1.04	.01	.0033	.0079	-.0068	.0033	.0079	-.0068	.0026	.0077	-.0086	.0007	.0002	.0018
.798	1.04	-3.01	-.0109	.0087	.0107	-.0109	.0087	.0107	-.0104	.0082	.0092	-.0005	.0005	.0015
.802	1.04	.01	.0041	.0080	-.0075	.0041	.0080	-.0075	.0029	.0077	-.0091	.0012	.0003	.0016
.800	1.04	3.02	.0173	.0090	-.0237	.0173	.0090	-.0237	.0152	.0083	-.0257	.0020	.0007	.0020
.802	1.03	6.00	.0335	.0114	-.0468	.0336	.0114	-.0468	.0287	.0105	-.0451	.0049	.0009	-.0017
.801	1.04	8.99	.0411	.0142	-.0550	.0412	.0142	-.0550	.0343	.0130	-.0528	.0069	.0012	-.0022
.799	1.04	-.02	.0020	.0076	-.0063	.0020	.0076	-.0063	.0025	.0077	-.0084	-.0005	-.0001	.0022
.602	1.02	.01	.0009	.0074	-.0041	.0009	.0074	-.0041	.0016	.0070	-.0056	-.0007	.0004	.0016
.599	2.06	.01	.0013	-.0617	.0040	.0029	.0070	-.0038	.0013	.0068	-.0050	.0015	.0002	.0012
.598	3.04	.00	.0019	-.1213	.0089	.0031	.0092	-.0047	.0011	.0068	-.0047	.0020	.0024	.0000
.599	4.03	.00	.0025	-.1843	.0147	.0041	.0078	-.0037	.0016	.0069	-.0053	.0025	.0010	.0016
.599	5.60	-.01	.0026	-.2845	.0247	.0005	.0069	-.0028	.0013	.0068	-.0051	-.0008	.0001	.0022
.600	5.99	-.01	.0028	-.3084	.0269	.0001	.0072	-.0027	.0012	.0068	-.0049	-.0011	.0004	.0022
.598	1.02	.00	.0036	.0077	-.0050	.0036	.0077	-.0050	.0019	.0070	-.0059	.0017	.0007	.0009
.601	1.02	-3.03	-.0104	.0084	.0117	-.0104	.0084	.0117	-.0108	.0075	.0111	.0004	.0009	.0006
.601	1.02	.02	.0041	.0081	-.0050	.0041	.0081	-.0050	.0018	.0070	-.0057	.0023	.0012	.0007
.600	1.02	3.01	.0173	.0091	-.0211	.0173	.0091	-.0211	.0148	.0075	-.0229	.0025	.0016	.0019
.600	1.02	5.99	.0351	.0115	-.0449	.0352	.0115	-.0449	.0292	.0096	-.0429	.0060	.0018	-.0020
.601	1.02	8.98	.0436	.0148	-.0544	.0437	.0148	-.0544	.0368	.0123	-.0534	.0068	.0024	-.0010
.598	1.02	-3.01	-.0112	.0079	.0118	-.0113	.0079	.0118	-.0105	.0075	.0107	-.0007	.0004	.0011
.599	5.63	-3.01	-.0261	-.2848	.0399	-.0129	.0076	.0122	-.0108	.0074	.0110	-.0021	.0003	.0013
.598	5.64	.01	.0029	-.2873	.0249	.0007	.0070	-.0029	.0016	.0068	-.0054	-.0009	.0002	.0025
.600	5.67	3.02	.0320	-.2860	.0085	.0143	.0081	-.0193	.0146	.0074	-.0227	-.0003	.0008	.0034
.600	5.65	5.98	.0648	-.2813	-.0155	.0321	.0105	-.0431	.0288	.0094	-.0422	.0033	.0010	-.0009
.602	5.65	8.99	.0875	-.2745	-.0239	.0398	.0134	-.0514	.0361	.0121	-.0521	.0038	.0013	.0007
.600	1.02	-.04	.0021	.0075	-.0036	.0021	.0075	-.0036	.0014	.0070	-.0052	.0007	.0005	.0017

Table 4. Aeropropulsive Characteristics for AXI Nozzle With Three Tails

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
1.198	.90	-.03	-.0039	.0236	-.0006	-.0039	.0236	-.0006	-.0058	.0107	.0049	.0020	.0129	-.0055
1.200	1.96	.01	-.0064	.0049	.0046	-.0060	.0207	.0028	-.0059	.0107	.0049	-.0001	.0100	-.0020
1.200	4.04	.01	-.0067	-.0269	.0085	-.0063	.0210	.0039	-.0059	.0108	.0049	-.0004	.0103	-.0010
1.199	5.64	-.03	-.0064	-.0526	.0100	-.0069	.0206	.0031	-.0063	.0108	.0056	-.0006	.0099	-.0025
1.201	8.01	.00	-.0056	-.0904	.0122	-.0071	.0204	.0019	-.0058	.0108	.0049	-.0013	.0096	-.0030
1.201	9.96	.01	-.0057	-.1224	.0153	-.0081	.0198	.0022	-.0058	.0108	.0050	-.0022	.0090	-.0028
1.200	10.99	.01	-.0053	-.1396	.0167	-.0081	.0195	.0021	-.0060	.0108	.0052	-.0021	.0087	-.0030
1.200	.87	.02	-.0064	.0233	.0022	-.0064	.0233	.0022	-.0055	.0109	.0042	-.0009	.0124	-.0020
1.199	.88	-3.02	-.0460	.0258	.0519	-.0460	.0258	.0519	-.0433	.0128	.0573	-.0026	.0130	-.0054
1.201	.87	.00	-.0036	.0239	-.0019	-.0036	.0239	-.0019	-.0045	.0109	.0029	.0009	.0130	-.0048
1.200	.88	3.03	.0374	.0262	-.0544	.0374	.0262	-.0544	.0342	.0128	-.0516	.0032	.0134	-.0028
1.201	.82	5.98	.0748	.0333	-.1018	.0748	.0333	-.1018	.0624	.0184	-.0910	.0124	.0149	-.0107
1.199	.79	7.78	.0952	.0399	-.1313	.0953	.0399	-.1313	.0811	.0232	-.1200	.0142	.0167	-.0112
1.200	.88	-3.01	-.0463	.0260	.0521	-.0463	.0260	.0521	-.0436	.0129	.0577	-.0028	.0131	-.0056
1.201	5.63	-2.97	-.0492	-.0499	.0588	-.0459	.0229	.0519	-.0433	.0128	.0575	-.0026	.0101	-.0056
1.200	5.64	.01	-.0025	-.0520	.0039	-.0031	.0211	-.0030	-.0042	.0109	.0026	.0011	.0102	-.0056
1.200	5.63	3.00	.0411	-.0496	-.0461	.0368	.0234	-.0530	.0342	.0128	-.0516	.0025	.0106	-.0014
1.203	5.66	5.96	.0850	-.0424	-.0970	.0769	.0302	-.1039	.0680	.0185	-.0998	.0089	.0117	-.0041
1.198	5.63	7.71	.1030	-.0358	-.1192	.0927	.0367	-.1261	.0808	.0231	-.1196	.0119	.0136	-.0065
1.200	.85	.01	-.0056	.0237	.0014	-.0056	.0237	.0014	-.0056	.0109	.0043	.0000	.0128	-.0029
.901	1.02	-.02	-.0030	.0100	-.0024	-.0030	.0100	-.0024	-.0006	.0091	-.0047	-.0024	.0009	.0022
.899	2.03	.00	-.0037	-.0208	.0027	-.0030	.0089	-.0007	-.0009	.0086	-.0041	-.0021	.0002	.0034
.899	2.98	.00	-.0041	-.0464	.0061	-.0036	.0098	.0002	-.0012	.0088	-.0037	-.0025	.0010	.0039
.901	4.03	.03	-.0040	-.0753	.0089	-.0034	.0094	.0007	-.0015	.0088	-.0032	-.0019	.0007	.0039
.899	5.60	-.02	-.0043	-.1202	.0138	-.0052	.0090	.0016	-.0015	.0087	-.0030	-.0036	.0003	.0046
.899	7.71	-.01	-.0042	-.1803	.0204	-.0067	.0089	.0028	-.0020	.0086	-.0023	-.0047	.0003	.0051
.899	1.02	-.02	-.0024	.0098	-.0020	-.0024	.0098	-.0020	-.0009	.0091	-.0042	-.0015	.0008	.0022
.903	1.03	-3.01	-.0109	.0102	.0110	-.0109	.0102	.0110	-.0077	.0094	.0081	-.0032	.0008	.0029
.902	1.02	-.01	-.0012	.0101	-.0028	-.0012	.0101	-.0028	-.0009	.0091	-.0043	-.0003	.0010	.0015
.901	1.03	3.02	.0137	.0108	-.0250	.0137	.0108	-.0250	.0110	.0094	-.0244	.0027	.0015	-.0006
.900	1.03	5.99	.0299	.0127	-.0496	.0299	.0127	-.0496	.0278	.0113	-.0515	.0021	.0014	.0019
.899	1.05	8.99	.0666	.0195	-.1003	.0667	.0195	-.1003	.0580	.0169	-.0974	.0086	.0025	-.0029
.899	1.03	-3.02	-.0108	.0099	.0105	-.0109	.0099	.0105	-.0076	.0093	.0076	-.0033	.0005	.0030
.899	5.57	-2.99	-.0188	-.1191	.0266	-.0130	.0091	.0145	-.0089	.0090	.0098	-.0042	.0001	.0047
.902	5.60	.02	-.0042	-.1193	.0142	-.0051	.0091	.0021	-.0020	.0087	-.0023	-.0032	.0003	.0044
.901	5.57	3.02	.0175	-.1180	-.0079	.0098	.0096	-.0200	.0096	.0089	-.0218	.0003	.0007	.0018
.900	5.61	6.01	.0403	-.1168	-.0314	.0258	.0116	-.0436	.0261	.0107	-.0483	-.0002	.0009	.0047
.902	5.61	8.95	.0850	-.1086	-.0843	.0641	.0185	-.0965	.0561	.0162	-.0942	.0060	.0023	-.0023
.800	1.04	-.02	.0096	.0080	-.0187	.0096	.0080	-.0187	.0081	.0081	-.0178	.0015	.0000	-.0009
.801	2.01	-.03	.0114	-.0290	-.0176	.0123	.0076	-.0218	.0086	.0077	-.0186	.0037	-.0001	-.0032
.801	2.99	.00	.0112	-.0623	-.0135	.0118	.0087	-.0209	.0083	.0077	-.0180	.0036	.0010	-.0029
.800	4.05	-.01	.0104	-.1001	-.0091	.0113	.0081	-.0195	.0082	.0077	-.0178	.0031	.0004	-.0017
.801	5.60	-.01	.0105	-.1554	-.0036	.0093	.0075	-.0190	.0080	.0077	-.0174	.0014	-.0002	-.0016

Table 4. Concluded

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
.800	6.07	-.02	.0103	-.1724	-.0018	.0087	.0075	-.0187	.0078	.0077	-.0171	.0009	-.0002	-.0015
.801	7.01	-.02	.0109	-.2058	.0011	.0085	.0078	-.0189	.0080	.0076	-.0174	.0004	.0001	-.0014
.800	1.04	.01	.0100	.0079	-.0190	.0100	.0079	-.0190	.0084	.0081	-.0182	.0016	-.0002	-.0008
.801	1.04	-3.03	-.0046	.0086	.0008	-.0046	.0086	.0008	-.0052	.0084	.0025	.0006	.0002	-.0017
.803	1.04	-.02	.0107	.0081	-.0194	.0107	.0081	-.0194	.0085	.0081	-.0183	.0023	.0000	-.0011
.799	1.04	3.01	.0263	.0095	-.0406	.0263	.0095	-.0406	.0238	.0091	-.0413	.0025	.0004	.0007
.799	1.04	5.98	.0542	.0136	-.0831	.0542	.0136	-.0831	.0488	.0129	-.0810	.0055	.0008	-.0021
.798	1.04	8.98	.0778	.0196	-.1156	.0778	.0196	-.1156	.0707	.0187	-.1151	.0071	.0009	-.0005
.801	1.04	.02	.0091	.0077	-.0187	.0091	.0077	-.0187	.0084	.0081	-.0182	.0007	-.0004	-.0004
.603	1.02	.01	.0067	.0076	-.0147	.0067	.0076	-.0147	.0072	.0075	-.0150	-.0005	.0001	.0003
.601	2.02	.00	.0082	-.0588	-.0098	.0098	.0072	-.0172	.0075	.0073	-.0154	.0023	-.0001	-.0018
.601	3.04	.00	.0090	-.1204	-.0034	.0092	.0088	-.0169	.0072	.0073	-.0149	.0020	.0015	-.0020
.597	3.98	.00	.0079	-.1819	.0030	.0094	.0083	-.0163	.0073	.0073	-.0151	.0021	.0011	-.0012
.601	5.61	-.01	.0088	-.2829	.0122	.0067	.0072	-.0151	.0071	.0073	-.0148	-.0004	-.0001	-.0003
.601	5.98	-.01	.0085	-.3063	.0149	.0058	.0075	-.0146	.0071	.0072	-.0147	-.0013	.0003	.0002
.600	1.02	.01	.0077	.0076	-.0148	.0077	.0076	-.0148	.0071	.0075	-.0149	.0006	.0001	.0000
.600	1.02	-3.03	-.0075	.0082	.0060	-.0075	.0082	.0060	-.0082	.0079	.0080	.0007	.0003	-.0020
.600	1.02	-.01	.0090	.0080	-.0154	.0090	.0080	-.0154	.0072	.0075	-.0150	.0018	.0005	-.0004
.600	1.02	3.02	.0295	.0097	-.0434	.0295	.0097	-.0434	.0256	.0087	-.0424	.0039	.0010	-.0010
.601	1.02	5.97	.0544	.0137	-.0794	.0545	.0137	-.0794	.0490	.0122	-.0785	.0054	.0016	-.0009
.602	1.02	8.97	.0810	.0204	-.1194	.0810	.0204	-.1194	.0744	.0185	-.1185	.0067	.0020	-.0009
.600	1.02	-3.03	-.0077	.0080	.0060	-.0078	.0080	.0060	-.0083	.0079	.0081	.0006	.0001	-.0021
.599	5.68	-3.01	-.0213	-.2880	.0326	-.0080	.0078	.0046	-.0079	.0076	.0074	.0000	.0001	-.0027
.603	5.64	.01	.0091	-.2826	.0124	.0069	.0073	-.0150	.0070	.0073	-.0147	-.0002	.0000	-.0003
.601	5.58	3.00	.0434	-.2789	-.0144	.0262	.0087	-.0416	.0252	.0084	-.0416	.0011	.0002	.0000
.601	5.62	5.97	.0849	-.2753	-.0521	.0526	.0130	-.0794	.0491	.0120	-.0785	.0035	.0010	-.0009
.602	5.62	8.96	.1250	-.2663	-.0890	.0778	.0196	-.1163	.0733	.0181	-.1166	.0045	.0015	.0003
.599	1.02	-.01	.0088	.0079	-.0153	.0086	.0079	-.0153	.0070	.0075	-.0146	.0018	.0004	-.0007

Table 5. Aeropropulsive Characteristics for AXI Nozzle With Four Tails

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
1.203	.84	.00	-.0118	.0253	.0110	-.0118	.0253	.0110	-.0109	.0131	.0119	-.0009	.0122	-.0009
1.200	1.93	.01	-.0149	.0082	.0174	-.0146	.0234	.0157	-.0110	.0132	.0120	-.0036	.0102	.0037
1.200	4.02	.02	-.0154	-.0238	.0216	-.0150	.0239	.0170	-.0110	.0132	.0119	-.0041	.0107	.0051
1.200	5.63	-.01	-.0158	-.0495	.0243	-.0163	.0234	.0174	-.0114	.0132	.0125	-.0049	.0102	.0049
1.202	8.02	-.01	-.0155	-.0879	.0273	-.0169	.0231	.0170	-.0118	.0132	.0131	-.0052	.0099	.0039
1.199	10.03	-.01	-.0149	-.1212	.0297	-.0173	.0225	.0165	-.0118	.0132	.0132	-.0055	.0093	.0033
1.200	11.03	-.01	-.0143	-.1373	.0306	-.0170	.0222	.0160	-.0117	.0132	.0130	-.0054	.0089	.0030
1.201	.84	.01	-.0118	.0259	.0102	-.0118	.0259	.0102	-.0105	.0132	.0113	-.0013	.0127	-.0011
1.198	.84	-2.97	-.0652	.0280	.0801	-.0652	.0280	.0801	-.0586	.0155	.0782	-.0067	.0125	.0019
1.200	.83	.02	-.0105	.0263	.0087	-.0105	.0263	.0087	-.0098	.0133	.0102	-.0007	.0130	-.0014
1.202	.83	3.02	.0391	.0301	-.0560	.0391	.0301	-.0560	.0381	.0158	-.0574	.0010	.0143	.0013
1.200	.80	5.99	.0804	.0370	-.1098	.0805	.0370	-.1098	.0704	.0217	-.1036	.0101	.0153	-.0062
1.199	.79	6.97	.0929	.0407	-.1281	.0930	.0407	-.1281	.0817	.0244	-.1209	.0113	.0163	-.0072
1.199	.83	-3.01	-.0663	.0280	.0815	-.0663	.0280	.0815	-.0596	.0155	.0796	-.0068	.0125	.0020
1.201	5.63	-2.99	-.0715	-.0474	.0926	-.0682	.0255	.0857	-.0600	.0155	.0802	-.0083	.0100	.0055
1.200	5.59	-.01	-.0144	-.0485	.0230	-.0149	.0238	.0162	-.0111	.0133	.0120	-.0038	.0105	.0042
1.200	5.57	2.97	.0434	-.0450	-.0488	.0392	.0270	-.0556	.0375	.0157	-.0563	.0017	.0112	.0007
1.201	5.65	5.98	.0896	-.0388	-.1038	.0815	.0341	-.1107	.0707	.0218	-.1040	.0107	.0123	-.0067
1.200	.83	-.03	-.0123	.0264	.0119	-.0123	.0264	.0119	-.0122	.0133	.0135	-.0001	.0132	-.0016
.901	1.02	-.01	-.0037	.0132	-.0021	-.0037	.0132	-.0021	-.0012	.0118	-.0048	-.0026	.0014	.0027
.900	1.97	.00	-.0050	-.0165	.0043	-.0044	.0119	.0010	-.0016	.0111	-.0040	-.0028	.0007	.0051
.901	3.03	-.01	-.0049	-.0445	.0067	-.0044	.0128	.0007	-.0017	.0114	-.0040	-.0027	.0015	.0047
.902	4.05	-.04	-.0058	-.0726	.0107	-.0050	.0125	.0025	-.0023	.0114	-.0029	-.0027	.0011	.0054
.904	5.65	.00	-.0062	-.1172	.0160	-.0071	.0120	.0038	-.0029	.0114	-.0020	-.0042	.0006	.0058
.901	7.71	-.01	-.0050	-.1770	.0205	-.0074	.0117	.0029	-.0021	.0111	-.0033	-.0053	.0006	.0062
.900	1.02	.00	-.0025	.0129	-.0023	-.0025	.0129	-.0023	-.0011	.0117	-.0050	-.0015	.0012	.0027
.901	1.02	-3.02	-.0169	.0129	.0184	-.0169	.0129	.0184	-.0140	.0123	.0150	-.0029	.0006	.0035
.900	1.02	-.01	-.0019	.0131	-.0028	-.0019	.0131	-.0028	-.0007	.0117	-.0055	-.0012	.0015	.0027
.896	1.02	3.01	.0180	.0138	-.0318	.0180	.0138	-.0318	.0164	.0120	-.0327	.0016	.0018	.0009
.901	1.02	6.01	.0341	.0161	-.0561	.0342	.0161	-.0561	.0337	.0140	-.0606	.0005	.0021	.0045
.902	1.04	9.01	.0643	.0215	-.0967	.0644	.0215	-.0967	.0598	.0190	-.1012	.0046	.0025	.0044
.900	1.02	-3.01	-.0167	.0126	.0180	-.0167	.0126	.0180	-.0138	.0122	.0146	-.0030	.0004	.0034
.899	5.59	-3.02	-.0251	-.1169	.0353	-.0192	.0120	.0231	-.0151	.0117	.0167	-.0041	.0003	.0064
.901	5.60	.00	-.0038	-.1165	.0143	-.0047	.0123	.0022	-.0019	.0113	-.0035	-.0028	.0010	.0056
.899	5.60	3.02	.0226	-.1160	-.0145	.0149	.0129	-.0267	.0146	.0116	-.0300	.0003	.0012	.0032
.899	5.61	5.98	.0472	-.1136	-.0417	.0329	.0151	-.0540	.0338	.0135	-.0602	-.0009	.0016	.0062
.899	5.61	9.00	.0865	-.1067	-.0862	.0654	.0211	-.0984	.0609	.0187	-.1026	.0044	.0023	.0042
.802	1.03	-.02	.0131	.0096	-.0226	.0131	.0096	-.0226	.0127	.0095	-.0252	.0004	.0001	.0026
.801	2.05	-.02	.0104	-.0293	-.0147	.0113	.0087	-.0189	.0112	.0090	-.0226	.0002	-.0003	.0037
.801	3.02	-.02	.0105	-.0619	-.0117	.0112	.0100	-.0193	.0112	.0090	-.0226	.0001	.0010	.0034
.800	4.06	-.03	.0111	-.0993	-.0089	.0120	.0094	-.0193	.0114	.0090	-.0230	.0005	.0003	.0037
.802	5.59	-.01	.0113	-.1533	-.0036	.0102	.0089	-.0189	.0113	.0090	-.0229	-.0012	-.0001	.0040
.802	6.01	-.01	.0111	-.1683	-.0018	.0096	.0090	-.0184	.0112	.0090	-.0226	-.0016	.0000	.0042

Table 5. Concluded

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
.802	7.00	-.01	.0109	-.2033	.0020	.0084	.0090	-.0178	.0110	.0089	-.0224	-.0026	.0000	.0046
.800	1.03	.02	.0130	.0093	-.0224	.0130	.0093	-.0224	.0128	.0095	-.0253	.0002	-.0001	.0029
.799	1.04	-3.03	-.0085	.0098	.0068	-.0085	.0098	.0068	-.0078	.0097	.0050	-.0006	.0001	.0018
.798	1.03	.00	.0135	.0097	-.0227	.0135	.0097	-.0227	.0131	.0094	-.0256	.0004	.0003	.0029
.800	1.03	3.01	.0351	.0116	-.0519	.0351	.0116	-.0519	.0341	.0110	-.0565	.0010	.0006	.0045
.797	1.03	5.97	.0675	.0162	-.1007	.0676	.0162	-.1007	.0638	.0156	-.1027	.0038	.0006	.0019
.799	1.03	8.97	.0938	.0234	-.1389	.0939	.0234	-.1389	.0877	.0226	-.1411	.0062	.0008	.0022
.799	1.03	-.02	.0118	.0092	-.0220	.0118	.0092	-.0220	.0128	.0094	-.0252	-.0010	-.0002	.0032
.602	1.02	.01	.0095	.0088	-.0177	.0095	.0088	-.0177	.0104	.0086	-.0199	-.0009	.0001	.0021
.602	2.05	-.01	.0089	-.0595	-.0086	.0104	.0083	-.0162	.0094	.0084	-.0182	.0010	.0000	.0020
.598	3.07	-.02	.0098	-.1215	-.0040	.0111	.0104	-.0178	.0096	.0084	-.0186	.0015	.0021	.0008
.598	4.01	-.02	.0092	-.1813	.0029	.0109	.0094	-.0154	.0090	.0084	-.0177	.0018	.0010	.0023
.599	5.69	-.03	.0094	-.2885	.0136	.0073	.0085	-.0144	.0088	.0084	-.0174	-.0015	.0001	.0030
.601	5.99	-.03	.0099	-.3055	.0151	.0073	.0089	-.0145	.0091	.0084	-.0177	-.0017	.0005	.0032
.600	1.02	-.02	.0113	.0089	-.0180	.0113	.0089	-.0180	.0102	.0086	-.0195	.0011	.0003	.0015
.601	1.02	-3.02	-.0110	.0098	.0127	-.0111	.0098	.0127	-.0114	.0091	.0119	.0004	.0007	.0008
.598	1.02	.02	.0130	.0096	-.0192	.0130	.0096	-.0192	.0108	.0086	-.0203	.0022	.0010	.0012
.600	1.02	3.02	.0365	.0114	-.0513	.0365	.0114	-.0513	.0347	.0102	-.0550	.0019	.0012	.0036
.602	1.02	5.97	.0695	.0162	-.0995	.0696	.0162	-.0995	.0646	.0147	-.1003	.0050	.0015	.0008
.600	1.02	8.97	.0974	.0242	-.1403	.0974	.0242	-.1403	.0914	.0221	-.1427	.0061	.0021	.0024
.606	1.02	-3.02	-.0120	.0091	.0131	-.0120	.0091	.0131	-.0115	.0091	.0120	-.0005	.0000	.0011
.598	5.58	-3.02	-.0271	-.2819	.0414	-.0139	.0088	.0140	-.0121	.0089	.0129	-.0018	.0000	.0011
.599	5.65	.01	.0111	-.2860	.0120	.0089	.0086	-.0158	.0098	.0084	-.0187	-.0009	.0002	.0029
.598	5.60	2.98	.0497	-.2809	-.0195	.0325	.0106	-.0470	.0329	.0099	-.0522	-.0005	.0007	.0052
.602	5.58	5.99	.0971	-.2699	-.0680	.0652	.0152	-.0950	.0633	.0144	-.0982	.0019	.0008	.0032
.601	5.58	8.99	.1401	-.2610	-.1088	.0932	.0231	-.1360	.0902	.0216	-.1407	.0030	.0014	.0047
.601	1.02	.00	.0119	.0089	-.0185	.0119	.0089	-.0185	.0105	.0086	-.0200	.0013	.0003	.0015

Table 6. Aeropropulsive Characteristics for LO Nozzle With Tails Off

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
1.202	.95	.01	-.0042	.0180	.0030	-.0042	.0180	.0030	-.0045	.0055	.0044	.0003	.0125	-.0013
1.199	2.01	.02	-.0052	.0002	.0052	-.0039	.0165	.0008	-.0045	.0055	.0044	.0006	.0110	-.0036
1.199	4.03	.01	-.0052	-.0308	.0079	-.0055	.0170	.0034	-.0045	.0055	.0044	-.0010	.0115	-.0010
1.200	5.51	.00	-.0054	-.0549	.0104	-.0057	.0168	.0035	-.0045	.0055	.0044	-.0012	.0113	-.0009
1.201	8.04	-.01	-.0053	-.0972	.0144	-.0056	.0151	.0031	-.0044	.0055	.0042	-.0012	.0096	-.0011
1.199	11.05	-.01	-.0049	-.1476	.0189	-.0052	.0137	.0025	-.0043	.0055	.0040	-.0009	.0083	-.0015
1.199	.95	.01	-.0051	.0183	.0028	-.0051	.0183	.0028	-.0043	.0056	.0041	-.0008	.0127	-.0013
1.198	.90	6.03	.0286	.0261	-.0250	.0286	.0261	-.0250	.0232	.0089	-.0226	.0054	.0172	-.0024
1.201	2.03	6.00	.0312	.0064	-.0246	.0308	.0230	-.0291	.0232	.0088	-.0225	.0076	.0142	-.0065
1.202	4.04	6.01	.0277	-.0250	-.0086	.0225	.0224	-.0131	.0229	.0087	-.0222	-.0005	.0136	.0092
1.201	5.64	6.01	.0310	-.0513	-.0070	.0230	.0220	-.0142	.0231	.0087	-.0223	-.0001	.0132	.0081
1.201	8.04	5.01	.0351	-.0912	-.0034	.0230	.0205	-.0147	.0230	.0087	-.0222	.0001	.0118	.0075
1.198	9.98	6.02	.0387	-.1243	-.0007	.0233	.0194	-.0153	.0228	.0087	-.0220	.0005	.0107	.0067
1.200	10.99	6.02	.0405	-.1405	.0006	.0235	.0188	-.0156	.0229	.0087	-.0221	.0006	.0102	.0065
1.202	.98	-2.97	-.0220	.0196	.0151	-.0220	.0196	.0151	-.0180	.0066	.0165	-.0040	.0130	-.0015
1.202	.95	.03	-.0047	.0185	.0027	-.0047	.0185	.0027	-.0043	.0056	.0041	-.0004	.0129	-.0014
1.201	.95	3.02	.0114	.0199	-.0090	.0114	.0199	-.0090	.0099	.0062	-.0092	.0015	.0138	.0001
1.201	.94	5.99	.0292	.0243	-.0230	.0292	.0243	-.0230	.0249	.0084	-.0236	.0043	.0159	.0006
1.200	.87	8.99	.0447	.0334	-.0410	.0448	.0334	-.0410	.0350	.0124	-.0357	.0098	.0210	-.0053
1.201	.97	-3.00	-.0216	.0198	.0149	-.0216	.0198	.0149	-.0180	.0066	.0165	-.0036	.0132	-.0017
.603	1.04	-.02	-.0045	.0043	.0025	-.0045	.0043	.0025	-.0020	.0051	.0010	-.0025	-.0008	.0014
.600	1.98	.02	-.0068	-.0592	.0163	-.0014	.0040	-.0010	-.0025	.0048	.0017	.0011	-.0008	-.0027
.601	3.01	-.03	-.0008	-.1209	.0135	-.0015	.0048	.0015	-.0020	.0048	.0010	.0005	.0000	.0005
.601	4.01	-.02	-.0004	-.1841	.0196	-.0015	.0049	.0018	-.0021	.0048	.0011	.0006	.0000	.0007
.601	5.63	-.03	.0003	-.2884	.0292	-.0007	.0051	.0005	-.0021	.0048	.0011	.0014	.0003	-.0006
.601	5.75	-.02	.0023	-.2955	.0292	.0012	.0056	-.0003	-.0021	.0048	.0010	.0032	.0009	-.0013
.600	1.04	-.03	.0004	.0043	.0010	.0004	.0043	.0010	-.0022	.0049	.0012	.0026	-.0006	-.0002
1.200	5.64	-2.98	-.0201	-.0548	.0173	-.0166	.0189	.0100	-.0177	.0065	.0162	.0011	.0124	-.0061
1.199	5.60	.03	-.0022	-.0556	.0093	-.0025	.0176	.0022	-.0040	.0054	.0038	.0015	.0122	-.0016
1.200	5.61	3.03	.0153	-.0542	.0015	.0111	.0188	-.0056	.0099	.0061	-.0091	.0012	.0127	.0034
1.200	5.61	5.98	.0349	-.0510	-.0091	.0270	.0217	-.0163	.0245	.0083	-.0231	.0025	.0134	.0068
1.199	5.60	8.99	.0525	-.0433	-.0236	.0409	.0289	-.0308	.0345	.0122	-.0351	.0064	.0167	.0043
1.200	.94	.02	-.0037	.0186	.0024	-.0037	.0186	.0024	-.0045	.0055	.0043	.0008	.0131	-.0019
.899	1.09	-.03	-.0042	.0040	.0028	-.0042	.0040	.0028	-.0040	.0059	.0028	-.0002	-.0020	.0000
.900	2.01	.00	-.0036	-.0265	.0054	-.0012	.0025	-.0025	-.0040	.0056	.0029	.0028	-.0031	-.0054
.900	2.95	.01	-.0035	-.0499	.0077	-.0038	.0045	.0023	-.0039	.0056	.0027	.0001	-.0011	-.0005
.901	4.01	-.01	-.0037	-.0796	.0110	-.0042	.0044	.0031	-.0040	.0056	.0029	-.0003	-.0012	.0003
.902	5.67	.00	-.0036	-.1270	.0156	-.0041	.0044	.0028	-.0040	.0055	.0029	-.0002	-.0011	-.0001
.901	7.72	-.01	-.0032	-.1867	.0211	-.0037	.0039	.0021	-.0039	.0054	.0027	.0001	-.0015	-.0007
.899	1.09	.01	-.0036	.0039	.0028	-.0036	.0039	.0028	-.0039	.0059	.0028	.0003	-.0021	.0001
.897	1.10	6.03	-.0022	.0031	.0055	-.0022	.0031	.0055	-.0046	.0054	.0049	.0024	-.0023	.0006
.898	1.94	6.02	.0008	-.0250	.0082	.0003	.0022	.0008	-.0046	.0050	.0050	.0049	-.0028	-.0042
.900	2.97	6.01	.0040	-.0508	.0100	-.0019	.0038	.0046	-.0048	.0050	.0050	.0028	-.0012	-.0004

Table 6. Continued

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
.899	4.01	6.02	.0066	-.0798	.0137	-.0028	.0040	.0058	-.0047	.0050	.0050	.0020	-.0010	.0008
.901	5.62	6.01	.0117	-.1255	.0179	-.0024	.0041	.0052	-.0049	.0049	.0052	.0024	-.0009	.0000
.901	7.75	6.00	.0183	-.1863	.0233	-.0022	.0035	.0042	-.0049	.0048	.0051	.0027	-.0013	-.0009
.900	1.10	-2.98	-.0031	.0038	.0006	-.0031	.0038	.0006	-.0024	.0061	.0008	-.0008	-.0022	-.0002
.899	1.10	.02	-.0027	.0040	.0024	-.0027	.0040	.0024	-.0038	.0060	.0026	.0011	-.0019	-.0002
.898	1.10	3.03	-.0017	.0038	.0036	-.0017	.0038	.0036	-.0047	.0057	.0041	.0030	-.0019	-.0004
.900	1.10	6.01	-.0015	.0031	.0053	-.0014	.0031	.0053	-.0051	.0054	.0054	.0037	-.0023	-.0001
.898	1.11	8.98	.0041	.0039	.0036	.0042	.0039	.0036	-.0017	.0058	.0038	.0059	-.0019	-.0002
.899	1.10	-3.00	-.0031	.0036	.0007	-.0032	.0036	.0007	-.0025	.0060	.0010	-.0006	-.0024	-.0003
.901	5.64	-3.01	-.0094	-.1260	.0134	-.0031	.0045	.0006	-.0024	.0056	.0008	-.0007	-.0011	-.0002
.903	5.65	.02	-.0026	-.1263	.0153	-.0032	.0043	.0025	-.0039	.0055	.0028	.0007	-.0012	-.0003
.899	5.57	3.02	.0049	-.1248	.0162	-.0024	.0043	.0036	-.0048	.0052	.0042	.0024	-.0009	-.0007
.898	5.56	5.99	.0119	-.1243	.0176	-.0021	.0041	.0049	-.0046	.0049	.0049	.0025	-.0009	.0001
.900	5.62	9.00	.0248	-.1239	.0155	.0039	.0050	.0027	-.0016	.0054	.0036	.0055	-.0004	-.0008
.800	1.07	-.02	-.0021	.0040	.0023	-.0021	.0040	.0023	-.0033	.0054	.0024	.0013	-.0014	-.0001
.800	2.02	.01	-.0016	-.0343	.0057	.0015	.0029	-.0043	-.0033	.0051	.0024	.0047	-.0023	-.0067
.800	2.99	-.03	-.0015	-.0658	.0086	-.0019	.0043	.0019	-.0033	.0051	.0024	.0014	-.0008	-.0005
.801	4.01	-.01	-.0016	-.1018	.0125	-.0023	.0045	.0025	-.0032	.0051	.0023	.0009	-.0006	.0002
.801	5.61	-.02	-.0015	-.1596	.0181	-.0022	.0047	.0021	-.0033	.0051	.0024	.0011	-.0004	-.0003
.799	6.00	-.02	-.0019	-.1749	.0196	-.0025	.0048	.0020	-.0032	.0050	.0022	.0007	-.0003	-.0003
.801	6.95	-.03	-.0015	-.2085	.0227	-.0020	.0045	.0015	-.0032	.0050	.0023	.0011	-.0005	-.0008
.799	1.07	.03	-.0019	.0039	.0024	-.0019	.0039	.0024	-.0031	.0054	.0022	.0012	-.0015	.0001
.800	1.08	-3.02	-.0045	.0039	.0020	-.0045	.0039	.0020	-.0047	.0056	.0033	.0002	-.0017	-.0012
.799	1.07	.02	-.0023	.0038	.0025	-.0023	.0038	.0025	-.0031	.0054	.0022	.0008	-.0016	.0004
.800	1.07	3.03	.0000	.0038	.0030	.0000	.0038	.0030	-.0016	.0053	.0013	.0016	-.0015	.0017
.803	1.08	6.01	.0016	.0040	.0030	.0016	.0041	.0030	-.0007	.0054	.0011	.0024	-.0014	.0019
.799	1.08	9.01	.0068	.0054	.0002	.0068	.0054	.0002	.0026	.0061	-.0019	.0042	-.0007	.0021
.800	5.58	-3.01	-.0123	-.1585	.0178	-.0044	.0051	.0018	-.0043	.0053	.0027	-.0002	-.0002	-.0009
.801	5.60	.03	-.0010	-.1590	.0177	-.0017	.0050	.0016	-.0027	.0051	.0017	.0010	-.0001	-.0001
.797	5.59	3.03	.0098	-.1589	.0177	.0005	.0051	.0016	-.0013	.0050	.0009	.0018	.0001	.0007
.799	5.63	5.99	.0201	-.1591	.0178	.0022	.0056	.0016	-.0003	.0051	.0005	.0025	.0005	.0011
.800	5.63	8.99	.0340	-.1569	.0146	.0075	.0066	-.0016	.0028	.0058	-.0022	.0047	.0008	.0005
.800	1.07	.01	-.0015	.0044	.0018	-.0015	.0044	.0018	-.0028	.0054	.0018	.0013	-.0010	.0000
.601	1.04	6.02	.0054	.0057	.0001	.0054	.0057	.0001	.0018	.0053	-.0019	.0036	.0004	.0020
.600	2.00	6.01	.0112	-.0591	.0088	.0100	.0058	-.0091	.0018	.0051	-.0019	.0082	.0007	-.0073
.600	3.01	5.99	.0190	-.1189	.0121	.0051	.0062	.0001	.0019	.0051	-.0020	.0032	.0010	.0020
.601	3.98	5.99	.0255	-.1796	.0179	.0049	.0062	.0003	.0019	.0051	-.0020	.0029	.0011	.0024
.600	5.58	5.98	.0366	-.2823	.0273	.0052	.0066	-.0011	.0019	.0051	-.0021	.0033	.0015	.0011
.601	5.82	5.98	.0379	-.2973	.0288	.0049	.0065	-.0012	.0019	.0050	-.0022	.0031	.0014	.0010
.601	1.04	-2.98	-.0032	.0047	.0017	-.0033	.0047	.0017	-.0045	.0051	.0033	.0012	-.0004	-.0016
.600	1.04	.00	-.0002	.0044	.0016	-.0002	.0044	.0016	-.0021	.0048	.0012	.0019	-.0005	.0004
.599	1.04	3.03	.0022	.0045	.0018	.0022	.0045	.0018	-.0003	.0049	-.0001	.0025	-.0004	.0019
.597	1.04	5.98	.0043	.0049	.0011	.0044	.0049	.0011	.0012	.0051	-.0011	.0031	-.0002	.0022

Table 6. Concluded

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
.602	1.04	8.98	.0086	.0060	-.0018	.0086	.0060	-.0018	.0042	.0059	-.0041	.0044	.0001	.0023
.601	1.04	-2.97	-.0052	.0043	.0029	-.0053	.0043	.0029	-.0048	.0050	.0037	-.0005	-.0007	-.0008
.602	5.63	-3.03	-.0192	-.2870	.0311	-.0050	.0052	.0025	-.0046	.0049	.0035	-.0004	.0004	-.0010
.602	5.58	.03	-.0007	-.2841	.0300	-.0020	.0047	.0018	-.0024	.0047	.0016	.0004	.0000	.0002
.601	5.59	3.02	.0167	-.2859	.0301	.0002	.0048	.0017	-.0006	.0046	.0003	.0009	.0001	.0014
.600	5.59	5.98	.0348	-.2846	.0288	.0033	.0054	.0003	.0015	.0050	-.0015	.0018	.0004	.0019
.601	5.60	9.01	.0548	-.2302	.0251	.0082	.0068	-.0033	.0047	.0058	-.0048	.0036	.0011	.0015
.601	1.04	-.01	-.0018	.0039	.0024	-.0018	.0039	.0024	-.0020	.0049	.0012	.0002	-.0010	.0013

Table 7. Aeropropulsive Characteristics for LO Nozzle With Two Tails

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
1.207	.94	.01	-.0124	.0232	.0129	-.0124	.0232	.0129	-.0127	.0102	.0161	.0003	.0130	-.0032
1.201	2.00	.01	-.0122	.0059	.0135	-.0108	.0220	.0091	-.0121	.0102	.0154	.0013	.0118	-.0062
1.200	3.99	.01	-.0124	-.0243	.0163	-.0127	.0228	.0119	-.0125	.0102	.0159	-.0002	.0126	-.0040
1.199	5.59	.00	-.0128	-.0504	.0189	-.0131	.0225	.0118	-.0130	.0102	.0165	.0000	.0123	-.0047
1.201	7.99	-.01	-.0130	-.0906	.0232	-.0133	.0210	.0120	-.0130	.0102	.0165	-.0004	.0108	-.0045
1.200	10.01	-.02	-.0134	-.1243	.0268	-.0136	.0200	.0123	-.0130	.0102	.0166	-.0006	.0098	-.0044
1.201	11.00	-.02	-.0139	-.1407	.0291	-.0141	.0195	.0129	-.0135	.0102	.0172	-.0006	.0094	-.0043
1.205	.94	.03	-.0141	.0238	.0140	-.0141	.0238	.0140	-.0130	.0102	.0166	-.0012	.0136	-.0026
1.194	.96	-3.03	-.0516	.0263	.0580	-.0516	.0263	.0580	-.0456	.0123	.0577	-.0060	.0140	.0003
1.200	.93	.01	-.0135	.0241	.0132	-.0135	.0241	.0132	-.0126	.0103	.0161	-.0009	.0138	-.0028
1.203	.95	3.01	.0214	.0256	-.0266	.0214	.0256	-.0266	.0196	.0116	-.0250	.0018	.0140	-.0015
1.199	.92	5.99	.0435	.0314	-.0474	.0435	.0314	-.0474	.0393	.0152	-.0479	.0042	.0162	.0004
1.200	.88	8.98	.0640	.0400	-.0713	.0641	.0400	-.0713	.0548	.0201	-.0679	.0093	.0199	-.0034
1.200	.96	-2.98	-.0522	.0263	.0593	-.0522	.0263	.0593	-.0465	.0122	.0592	-.0057	.0141	.0001
.603	1.04	.03	.0010	.0069	-.0067	.0010	.0069	-.0067	.0042	.0076	-.0087	-.0032	-.0007	.0020
.601	2.00	.01	-.0022	-.0574	.0086	.0033	.0070	-.0091	.0031	.0073	-.0069	.0002	-.0003	-.0022
.600	3.03	-.02	.0036	-.1196	.0053	.0028	.0073	-.0067	.0039	.0073	-.0081	-.0010	.0000	.0014
.601	4.04	-.03	.0044	-.1824	.0113	.0033	.0082	-.0066	.0038	.0073	-.0080	-.0005	.0009	.0014
.601	5.63	-.02	.0053	-.2851	.0210	.0042	.0080	-.0077	.0038	.0073	-.0079	.0005	.0007	.0002
.600	5.99	-.03	.0059	-.3095	.0229	.0048	.0080	-.0083	.0039	.0073	-.0081	.0009	.0008	-.0002
.599	1.04	-.02	.0052	.0065	-.0075	.0052	.0065	-.0075	.0038	.0074	-.0081	.0013	-.0009	.0006
.600	1.04	-3.02	-.0102	.0071	.0116	-.0102	.0071	.0116	-.0096	.0079	.0099	-.0006	-.0008	.0017
.601	1.04	-.02	.0074	.0070	-.0087	.0074	.0070	-.0087	.0042	.0075	-.0086	.0032	-.0004	-.0001
.600	1.04	3.03	.0230	.0084	-.0276	.0230	.0084	-.0276	.0187	.0083	-.0282	.0043	.0001	.0007
.599	1.04	5.96	.0372	.0111	-.0452	.0372	.0111	-.0452	.0314	.0105	-.0458	.0058	.0006	.0006
.600	1.04	3.97	.0472	.0149	-.0577	.0472	.0149	-.0577	.0401	.0136	-.0580	.0072	.0013	.0003
.600	1.04	-3.03	-.0082	.0070	.0104	-.0083	.0070	.0104	-.0091	.0078	.0093	.0009	-.0008	.0010
.600	5.61	-3.01	-.0239	-.2832	.0405	-.0097	.0088	.0119	-.0103	.0076	.0111	.0006	.0012	.0008
.600	5.59	-.02	.0078	-.2835	.0199	.0067	.0085	-.0086	.0038	.0072	-.0081	.0029	.0013	-.0006
.600	5.61	3.02	.0388	-.2832	.0006	.0222	.0096	-.0280	.0179	.0080	-.0272	.0043	.0017	-.0008
.597	5.61	5.97	.0688	-.2813	-.0178	.0369	.0127	-.0467	.0306	.0101	-.0447	.0063	.0026	-.0020
.604	5.64	8.99	.0933	-.2713	-.0304	.0467	.0161	-.0589	.0392	.0132	-.0568	.0075	.0029	-.0021
.602	5.56	.00	.0075	-.2793	.0197	.0064	.0085	-.0084	.0034	.0071	-.0074	.0030	.0014	-.0010
1.201	5.56	-3.01	-.0499	-.0470	.0607	-.0464	.0253	.0536	-.0460	.0121	.0586	-.0004	.0132	-.0050
1.200	5.62	.02	-.0094	-.0500	.0176	-.0097	.0234	.0104	-.0122	.0102	.0158	.0025	.0132	-.0054
1.200	5.65	3.01	.0305	-.0482	-.0249	.0263	.0256	-.0322	.0203	.0116	-.0257	.0060	.0140	-.0065
1.201	5.63	5.97	.0531	-.0428	-.0409	.0452	.0302	-.0481	.0390	.0150	-.0473	.0062	.0152	-.0008
1.202	5.59	8.98	.0769	-.0342	-.0637	.0653	.0376	-.0708	.0545	.0199	-.0674	.0108	.0177	-.0035
1.199	.93	.02	-.0125	.0245	.0136	-.0125	.0245	.0136	-.0134	.0102	.0173	.0010	.0143	-.0037
.899	1.09	.02	.0017	.0081	-.0088	.0017	.0081	-.0088	.0030	.0105	-.0114	-.0013	-.0024	.0025
.901	2.04	-.02	.0031	-.0231	-.0073	.0055	.0067	-.0151	.0033	.0099	-.0118	.0022	-.0032	-.0033
.901	2.98	-.01	.0035	-.0467	-.0055	.0032	.0083	-.0108	.0036	.0098	-.0123	-.0004	-.0015	.0015
.900	4.02	-.02	.0031	-.0760	-.0020	.0026	.0086	-.0100	.0034	.0098	-.0119	-.0007	-.0013	.0020

Table 7. Concluded

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
.900	5.64	-.02	.0037	-.1221	.0019	.0033	.0088	-.0109	.0035	.0097	-.0121	-.0002	-.0010	.0012
.900	8.04	-.02	.0049	-.1916	.0072	.0045	.0082	-.0128	.0040	.0094	-.0129	.0005	-.0012	.0001
.900	1.10	-3.03	-.0099	.0078	.0082	-.0099	.0078	.0082	-.0077	.0105	.0050	-.0022	-.0027	.0033
.899	1.09	.00	.0038	.0082	-.0096	.0038	.0082	-.0096	.0029	.0105	-.0113	.0009	-.0023	.0017
.900	1.10	3.01	.0145	.0089	-.0242	.0146	.0089	-.0242	.0120	.0111	-.0253	.0026	-.0022	.0011
.898	1.10	6.01	.0212	.0096	-.0333	.0212	.0096	-.0333	.0201	.0121	-.0371	.0011	-.0025	.0038
.897	1.11	8.99	.0318	.0123	-.0418	.0319	.0123	-.0418	.0256	.0140	-.0435	.0063	-.0017	.0017
.901	1.10	-3.01	-.0109	.0077	.0090	-.0109	.0077	.0090	-.0079	.0104	.0053	-.0031	-.0027	.0037
.900	5.59	-.02	.0046	-.1208	.0012	.0041	.0089	-.0115	.0037	.0097	-.0125	.0004	-.0008	.0010
.899	5.61	3.02	.0229	-.1204	-.0142	.0155	.0098	-.0270	.0132	.0103	-.0270	.0023	-.0005	.0000
.899	5.61	5.98	.0369	-.1188	-.0237	.0228	.0108	-.0364	.0202	.0114	-.0371	.0026	-.0006	.0007
.899	5.61	9.00	.0529	-.1153	-.0300	.0320	.0136	-.0427	.0249	.0131	-.0421	.0071	.0004	-.0006
.801	1.07	-.03	.0074	.0069	-.0121	.0074	.0069	-.0121	.0061	.0082	-.0130	.0013	-.0013	.0009
.803	1.99	-.02	.0028	-.0295	.0002	.0059	.0064	-.0097	.0048	.0078	-.0110	.0011	-.0014	.0013
.802	2.98	-.03	.0075	-.0619	-.0053	.0072	.0075	-.0121	.0057	.0078	-.0124	.0015	-.0003	.0003
.803	4.04	-.03	.0073	-.0993	-.0011	.0067	.0075	-.0112	.0055	.0078	-.0121	.0011	-.0004	.0009
.802	5.70	-.03	.0073	-.1596	.0049	.0067	.0075	-.0114	.0054	.0078	-.0119	.0013	-.0002	.0004
.802	6.00	-.03	.0075	-.1700	.0056	.0069	.0077	-.0118	.0054	.0078	-.0120	.0015	.0000	.0001
.801	6.98	-.03	.0076	-.2063	.0089	.0070	.0077	-.0123	.0056	.0077	-.0121	.0015	.0000	-.0002
.801	1.07	.00	.0076	.0067	-.0120	.0076	.0067	-.0120	.0060	.0082	-.0129	.0015	-.0015	.0010
.801	1.07	-3.02	-.0085	.0069	.0079	-.0085	.0069	.0079	-.0080	.0085	.0064	-.0005	-.0016	.0015
.801	1.07	-.02	.0074	.0067	-.0122	.0074	.0067	-.0122	.0065	.0082	-.0135	.0010	-.0015	.0013
.802	1.07	3.03	.0220	.0078	-.0305	.0220	.0078	-.0305	.0201	.0092	-.0324	.0019	-.0014	.0020
.800	1.07	5.97	.0347	.0100	-.0466	.0347	.0100	-.0466	.0320	.0114	-.0493	.0027	-.0013	.0027
.799	1.08	8.97	.0438	.0135	-.0563	.0439	.0135	-.0563	.0386	.0142	-.0583	.0053	-.0007	.0020
.800	5.61	-3.03	-.0186	-.1570	.0256	-.0106	.0076	.0095	-.0086	.0081	.0074	-.0020	-.0005	.0021
.801	5.57	-.01	.0071	-.1554	.0040	.0065	.0075	-.0119	.0060	.0078	-.0127	.0005	-.0003	.0008
.800	5.66	3.00	.0318	-.1575	-.0153	.0224	.0088	-.0316	.0196	.0087	-.0316	.0028	.0001	.0001
.799	5.64	5.98	.0530	-.1541	-.0314	.0351	.0112	-.0477	.0315	.0109	-.0482	.0036	.0004	.0006
.797	5.62	8.96	.0698	-.1498	-.0401	.0432	.0147	-.0564	.0377	.0136	-.0567	.0055	.0011	.0003
.801	1.07	-.02	.0072	.0066	-.0119	.0072	.0066	-.0119	.0062	.0082	-.0131	.0011	-.0016	.0012

Table 8. Aeropropulsive Characteristics for LO Nozzle With Three Tails

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
1.203	.95	-.01	-.0045	.0245	.0002	-.0045	.0245	.0002	-.0054	.0112	.0039	.0008	.0132	-.0037
1.201	2.00	.00	-.0049	.0069	.0022	-.0036	.0230	-.0022	-.0052	.0112	.0038	.0016	.0118	-.0059
1.203	4.01	-.01	-.0049	-.0235	.0050	-.0052	.0237	.0006	-.0052	.0113	.0037	.0000	.0124	-.0031
1.200	5.58	-.01	-.0049	-.0493	.0073	-.0051	.0234	.0002	-.0053	.0113	.0038	.0002	.0121	-.0036
1.201	8.04	-.01	-.0053	-.0900	.0118	-.0055	.0222	.0006	-.0056	.0112	.0044	.0001	.0110	-.0038
1.201	10.04	-.01	-.0049	-.1232	.0146	-.0052	.0214	.0000	-.0052	.0112	.0038	.0000	.0102	-.0038
1.202	11.00	.00	-.0049	-.1389	.0162	-.0052	.0210	.0000	-.0052	.0111	.0039	.0001	.0099	-.0039
1.202	.94	-.01	-.0048	.0249	-.0002	-.0048	.0249	-.0002	-.0051	.0113	.0034	.0003	.0136	-.0036
1.199	.95	-3.01	-.0480	.0267	.0563	-.0480	.0267	.0563	-.0421	.0133	.0546	-.0060	.0134	.0017
1.201	.94	-.03	-.0035	.0252	-.0015	-.0035	.0252	-.0015	-.0042	.0113	.0022	.0007	.0138	-.0037
1.201	.94	3.00	.0405	.0283	-.0589	.0405	.0283	-.0589	.0338	.0133	-.0505	.0067	.0150	-.0084
1.199	.95	5.97	.0750	.0355	-.1019	.0751	.0355	-.1019	.0610	.0188	-.0891	.0141	.0167	-.0128
1.201	.94	6.95	.0868	.0392	-.1198	.0869	.0392	-.1198	.0718	.0214	-.1061	.0150	.0178	-.0138
1.199	.95	-3.01	-.0483	.0269	.0563	-.0483	.0270	.0563	-.0421	.0133	.0545	-.0062	.0137	.0018
1.198	5.59	-2.99	-.0513	-.0473	.0637	-.0478	.0257	.0565	-.0422	.0133	.0548	-.0057	.0124	.0018
1.200	5.61	-.01	-.0031	-.0493	.0058	-.0034	.0239	-.0014	-.0043	.0114	.0023	.0009	.0125	-.0037
1.200	5.62	3.00	.0438	-.0468	-.0499	.0397	.0265	-.0571	.0332	.0133	-.0497	.0065	.0132	-.0074
1.201	5.63	5.96	.0838	-.0385	-.0961	.0760	.0345	-.1032	.0615	.0189	-.0897	.0144	.0156	-.0136
1.200	5.62	6.48	.0915	-.0366	-.1060	.0830	.0363	-.1132	.0669	.0202	-.0981	.0161	.0161	-.0151
1.201	.94	.01	-.0032	.0257	-.0012	-.0032	.0257	-.0012	-.0048	.0114	.0029	.0016	.0143	-.0041
.899	1.09	-.03	.0058	.0093	-.0152	.0058	.0093	-.0152	.0060	.0100	-.0168	-.0002	-.0007	.0016
.901	2.02	.01	.0047	-.0211	-.0094	.0071	.0080	-.0172	.0060	.0094	-.0167	.0011	-.0014	-.0006
.900	2.97	-.03	.0070	-.0452	-.0112	.0067	.0097	-.0165	.0065	.0093	-.0175	.0002	.0004	.0010
.900	4.02	-.01	.0075	-.0746	-.0082	.0069	.0100	-.0162	.0064	.0093	-.0173	.0005	.0006	.0011
.899	5.63	-.03	.0078	-.1209	-.0040	.0074	.0102	-.0168	.0063	.0092	-.0172	.0010	.0010	.0004
.900	7.72	-.03	.0082	-.1812	.0018	.0078	.0098	-.0173	.0060	.0089	-.0166	.0017	.0008	-.0007
.901	1.09	-.01	.0067	.0095	-.0151	.0067	.0095	-.0151	.0057	.0100	-.0163	.0010	-.0005	.0012
.899	1.10	-3.03	-.0027	.0091	-.0007	-.0027	.0091	-.0007	-.0017	.0099	-.0030	-.0010	-.0009	.0024
.901	1.09	-.02	.0077	.0096	-.0156	.0077	.0096	-.0156	.0059	.0100	-.0165	.0018	-.0004	.0009
.899	1.09	3.02	.0218	.0103	-.0371	.0218	.0103	-.0371	.0188	.0108	-.0381	.0031	-.0005	.0010
.899	1.10	5.98	.0391	.0126	-.0636	.0391	.0126	-.0636	.0356	.0133	-.0654	.0035	-.0007	.0018
.901	1.11	8.49	.0683	.0180	-.1026	.0683	.0180	-.1026	.0595	.0179	-.1022	.0088	.0000	-.0004
.900	1.09	-3.03	-.0036	.0088	-.0004	-.0036	.0088	-.0004	-.0017	.0099	-.0031	-.0019	-.0011	.0027
.898	5.61	-3.00	-.0089	-.1211	.0111	-.0026	.0096	-.0017	-.0014	.0091	-.0036	-.0012	.0005	.0019
.898	5.55	-.02	.0080	-.1191	-.0042	.0075	.0099	-.0168	.0063	.0091	-.0172	.0012	.0007	.0004
.899	5.57	3.01	.0293	-.1181	-.0259	.0220	.0111	-.0385	.0188	.0100	-.0379	.0032	.0011	-.0006
.900	5.64	5.98	.0523	-.1168	-.0503	.0382	.0135	-.0631	.0346	.0124	-.0636	.0036	.0010	.0005
.909	5.71	8.50	.0877	-.1093	-.0887	.0680	.0194	-.1015	.0563	.0169	-.0975	.0117	.0026	-.0040
.800	1.08	-.01	.0082	.0075	-.0150	.0082	.0075	-.0150	.0071	.0083	-.0166	.0011	-.0009	.0016
.800	2.05	.01	.0052	-.0303	-.0053	.0082	.0077	-.0152	.0064	.0078	-.0152	.0018	-.0001	.0000
.800	3.05	-.03	.0081	-.0637	-.0074	.0077	.0083	-.0143	.0066	.0079	-.0156	.0010	.0005	.0013
.801	4.02	-.03	.0082	-.0985	-.0042	.0076	.0084	-.0142	.0066	.0079	-.0156	.0010	.0005	.0014
.801	5.61	-.03	.0084	-.1558	.0012	.0079	.0089	-.0149	.0063	.0078	-.0151	.0016	.0011	.0002

Table 8. Concluded

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
.800	6.01	-.03	.0086	-.1708	.0027	.0081	.0089	-.0150	.0062	.0078	-.0150	.0019	.0011	.0000
.800	7.02	-.03	.0087	-.2072	.0063	.0081	.0088	-.0152	.0060	.0077	-.0147	.0021	.0011	-.0006
.799	1.08	-.01	.0086	.0075	-.0151	.0086	.0075	-.0151	.0072	.0083	-.0167	.0014	-.0008	.0016
.799	1.08	-3.02	-.0081	.0079	.0078	-.0081	.0080	.0078	-.0074	.0086	.0056	-.0007	-.0006	.0022
.801	1.08	-.03	.0094	.0079	-.0158	.0094	.0079	-.0158	.0076	.0083	-.0171	.0018	-.0004	.0014
.800	1.08	3.01	.0267	.0093	-.0398	.0267	.0093	-.0398	.0236	.0096	-.0414	.0031	-.0002	.0016
.600	1.08	5.97	.0515	.0129	-.0771	.0516	.0129	-.0771	.0465	.0130	-.0776	.0050	-.0001	.0005
.600	1.08	8.98	.0788	.0197	-.1154	.0788	.0197	-.1154	.0700	.0190	-.1144	.0088	.0007	-.0010
.799	1.08	-.01	.0078	.0073	-.0147	.0078	.0073	-.0147	.0072	.0083	-.0166	.0006	-.0010	.0019
.603	1.04	.00	.0078	.0073	-.0141	.0078	.0073	-.0141	.0068	.0077	-.0148	.0009	-.0004	.0007
.601	2.01	.01	.0032	-.0574	.0018	.0088	.0076	-.0159	.0057	.0073	-.0129	.0030	.0002	-.0030
.601	3.02	-.03	.0085	-.1180	-.0012	.0077	.0084	-.0133	.0061	.0074	-.0136	.0016	.0010	.0003
.600	4.02	-.03	.0087	-.1815	.0046	.0076	.0085	-.0132	.0060	.0074	-.0135	.0015	.0011	.0003
.601	5.61	-.03	.0094	-.2832	.0140	.0083	.0090	-.0145	.0059	.0074	-.0133	.0024	.0016	-.0013
.601	6.00	-.03	.0093	-.3081	.0169	.0083	.0092	-.0143	.0055	.0073	-.0126	.0028	.0018	-.0018
.599	1.04	.00	.0085	.0074	-.0139	.0085	.0074	-.0139	.0066	.0076	-.0143	.0019	-.0002	.0004
.597	1.04	-3.02	-.0100	.0078	.0127	-.0100	.0078	.0127	-.0106	.0080	.0113	.0005	-.0002	.0013
.602	1.04	.01	.0102	.0079	-.0151	.0102	.0079	-.0151	.0072	.0076	-.0152	.0031	.0002	.0001
.600	1.04	3.01	.0308	.0096	-.0431	.0308	.0097	-.0431	.0256	.0089	-.0427	.0052	.0007	-.0004
.608	1.04	5.98	.0563	.0138	-.0810	.0563	.0138	-.0810	.0489	.0126	-.0786	.0074	.0012	-.0023
.599	1.04	8.98	.0845	.0211	-.1235	.0846	.0211	-.1235	.0751	.0191	-.1199	.0095	.0021	-.0037
.599	1.04	-3.03	-.0117	.0073	.0136	-.0117	.0073	.0136	-.0105	.0080	.0113	-.0012	-.0007	.0023
.599	5.61	-3.02	-.0256	-.2844	.0417	-.0113	.0092	.0130	-.0105	.0078	.0115	-.0008	.0015	.0015
.602	5.65	.00	.0095	-.2844	.0141	.0083	.0089	-.0146	.0063	.0073	-.0137	.0020	.0016	-.0008
.601	5.64	3.00	.0460	-.2833	-.0150	.0294	.0106	-.0438	.0252	.0086	-.0421	.0042	.0020	-.0017
.593	5.59	5.97	.0873	-.2768	-.0536	.0557	.0149	-.0822	.0490	.0123	-.0787	.0066	.0026	-.0035
.600	5.59	8.97	.1306	-.2657	-.0954	.0840	.0223	-.1239	.0747	.0187	-.1189	.0093	.0036	-.0050
.600	1.04	-.03	.0085	.0070	-.0137	.0085	.0070	-.0137	.0067	.0076	-.0145	.0018	-.0006	.0008

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Table 9. Aeropropulsive Characteristics for LO Nozzle With Four Tails

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
1.202	.97	.02	-.0061	.0271	.0021	-.0061	.0271	.0021	-.0083	.0138	.0079	.0022	.0133	-.0058
1.200	1.98	.01	-.0075	.0104	.0044	-.0061	.0262	.0001	-.0084	.0137	.0080	.0023	.0124	-.0079
1.201	4.01	.00	-.0070	-.0205	.0060	-.0073	.0269	.0016	-.0086	.0137	.0083	.0013	.0131	-.0067
1.201	5.62	-.02	-.0076	-.0468	.0093	-.0078	.0264	.0021	-.0091	.0137	.0090	.0013	.0126	-.0069
1.202	8.04	-.01	-.0080	-.0873	.0139	-.0083	.0248	.0027	-.0094	.0136	.0096	.0011	.0112	-.0069
1.201	10.03	-.02	-.0082	-.1203	.0173	-.0084	.0240	.0027	-.0097	.0135	.0100	.0013	.0104	-.0073
1.201	11.05	-.02	-.0080	-.1375	.0187	-.0083	.0235	.0023	-.0094	.0135	.0096	.0011	.0100	-.0073
1.200	.94	.01	-.0076	.0279	.0022	-.0076	.0279	.0022	-.0086	.0138	.0082	.0011	.0141	-.0060
1.203	.96	-3.00	-.0619	.0294	.0741	-.0619	.0294	.0741	-.0560	.0155	.0741	-.0059	.0139	.0000
1.197	.94	.01	-.0066	.0283	.0007	-.0066	.0283	.0007	-.0077	.0139	.0069	.0011	.0145	-.0062
1.198	.95	3.01	.0468	.0316	-.0691	.0469	.0316	-.0691	.0390	.0167	-.0582	.0079	.0149	-.0109
1.197	.93	5.99	.0818	.0390	-.1133	.0819	.0390	-.1133	.0694	.0220	-.1026	.0124	.0170	-.0107
1.204	.95	-2.99	-.0615	.0296	.0739	-.0615	.0296	.0739	-.0557	.0155	.0738	-.0058	.0141	.0001
1.199	5.57	-2.99	-.0635	-.0440	.0797	-.0600	.0287	.0726	-.0558	.0156	.0740	-.0042	.0131	-.0014
1.202	5.61	.00	-.0049	-.0459	.0072	-.0052	.0271	.0001	-.0080	.0137	.0077	.0028	.0134	-.0076
1.201	5.61	3.00	.0521	-.0424	-.0629	.0481	.0305	-.0700	.0384	.0164	-.0570	.0097	.0141	-.0130
1.201	5.62	4.99	.0913	-.0373	-.1106	.0846	.0357	-.1178	.0673	.0205	-.0990	.0173	.0152	-.0188
1.200	.94	.01	-.0056	.0285	.0020	-.0056	.0285	.0020	-.0091	.0136	.0090	.0035	.0148	-.0070
.900	1.09	-.01	.0143	.0133	-.0295	.0143	.0133	-.0295	.0128	.0129	-.0280	.0015	.0004	-.0014
.902	2.00	.01	.0140	-.0171	-.0251	.0165	.0115	-.0329	.0130	.0122	-.0283	.0035	-.0007	-.0047
.901	3.02	.00	.0164	-.0429	-.0263	.0160	.0133	-.0317	.0136	.0121	-.0293	.0024	.0012	-.0024
.901	3.98	-.01	.0158	-.0694	-.0230	.0153	.0136	-.0308	.0131	.0121	-.0285	.0022	.0015	-.0023
.903	5.59	.02	.0162	-.1152	-.0187	.0156	.0136	-.0313	.0128	.0121	-.0280	.0029	.0014	-.0033
.899	7.66	-.03	.0173	-.1764	-.0142	.0169	.0131	-.0331	.0137	.0116	-.0293	.0032	.0016	-.0038
.902	1.09	.01	.0146	.0132	-.0288	.0146	.0132	-.0288	.0120	.0130	-.0268	.0026	.0002	-.0020
.901	1.09	-3.02	-.0022	.0122	-.0042	-.0023	.0122	-.0042	-.0022	.0124	-.0039	.0000	-.0002	-.0002
.898	1.09	.00	.0164	.0132	-.0306	.0164	.0132	-.0306	.0133	.0128	-.0288	.0031	.0004	-.0018
.904	1.09	3.00	.0329	.0152	-.0554	.0329	.0152	-.0554	.0281	.0145	-.0532	.0048	.0007	-.0021
.899	1.09	5.99	.0540	.0179	-.0879	.0541	.0179	-.0879	.0497	.0176	-.0877	.0044	.0003	-.0002
.901	1.11	8.99	.0918	.0255	-.1352	.0919	.0255	-.1352	.0757	.0234	-.1291	.0162	.0021	-.0061
.901	1.09	-3.00	-.0024	.0120	-.0041	-.0024	.0120	-.0041	-.0022	.0124	-.0042	-.0003	-.0004	.0001
.898	5.58	-3.00	-.0070	-.1175	.0059	-.0007	.0122	-.0068	-.0011	.0113	-.0060	.0004	.0009	-.0007
.899	5.63	-.01	.0175	-.1176	-.0199	.0170	.0134	-.0327	.0138	.0119	-.0296	.0032	.0014	-.0031
.902	5.59	3.01	.0424	-.1133	-.0475	.0351	.0156	-.0602	.0298	.0137	-.0557	.0053	.0019	-.0045
.899	5.61	5.99	.0688	-.1110	-.0774	.0547	.0187	-.0902	.0496	.0167	-.0872	.0051	.0020	-.0030
.903	5.64	8.00	.0942	-.1055	-.1053	.0756	.0232	-.1180	.0654	.0202	-.1124	.0102	.0029	-.0056
.798	1.07	.01	.0197	.0093	-.0318	.0197	.0093	-.0318	.0172	.0099	-.0314	.0025	-.0006	-.0005
.802	1.99	.02	.0199	-.0269	-.0284	.0229	.0087	-.0381	.0173	.0094	-.0314	.0056	-.0007	-.0067
.800	3.00	.01	.0192	-.0606	-.0245	.0188	.0099	-.0312	.0168	.0094	-.0306	.0020	.0005	-.0006
.799	4.00	-.02	.0188	-.0965	-.0202	.0182	.0101	-.0302	.0163	.0094	-.0298	.0019	.0007	-.0004
.798	5.62	-.02	.0186	-.1555	-.0142	.0180	.0102	-.0304	.0161	.0093	-.0294	.0020	.0009	-.0009
.802	6.02	-.02	.0193	-.1686	-.0134	.0187	.0102	-.0310	.0162	.0093	-.0297	.0025	.0009	-.0013
.799	6.91	-.02	.0190	-.2027	-.0095	.0184	.0100	-.0307	.0158	.0092	-.0290	.0025	.0008	-.0016

Table 9. Concluded

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
.799	1.07	.00	.0197	.0091	-.0319	.0197	.0091	-.0319	.0172	.0099	-.0313	.0026	-.0008	-.0006
.799	1.07	-3.02	-.0057	.0090	.0029	-.0057	.0090	.0029	-.0055	.0098	.0023	-.0002	-.0008	.0006
.798	1.07	-.01	.0205	.0093	-.0325	.0205	.0093	-.0325	.0175	.0099	-.0317	.0031	-.0005	-.0009
.800	1.07	2.99	.0457	.0118	-.0677	.0457	.0118	-.0677	.0411	.0120	-.0669	.0046	-.0003	-.0008
.800	1.08	5.98	.0753	.0168	-.1112	.0753	.0168	-.1112	.0692	.0170	-.1108	.0062	-.0002	-.0004
.800	1.08	8.99	.1037	.0249	-.1522	.1038	.0249	-.1522	.0937	.0243	-.1501	.0101	.0007	-.0022
.798	1.07	-.02	.0186	.0089	-.0310	.0186	.0089	-.0310	.0168	.0098	-.0308	.0017	-.0009	-.0001
.601	1.04	.01	.0150	.0085	-.0241	.0150	.0085	-.0241	.0129	.0090	-.0231	.0021	-.0005	-.0009
.601	2.06	.01	.0088	-.0605	-.0058	.0140	.0073	-.0233	.0110	.0087	-.0200	.0031	-.0014	-.0033
.601	3.01	-.02	.0155	-.1163	-.0115	.0147	.0096	-.0235	.0127	.0087	-.0226	.0021	.0008	-.0009
.601	4.03	-.01	.0156	-.1810	-.0052	.0145	.0096	-.0231	.0125	.0087	-.0223	.0020	.0008	-.0009
.600	5.58	-.02	.0153	-.2808	.0053	.0142	.0100	-.0231	.0119	.0087	-.0215	.0022	.0013	-.0017
.600	5.88	-.02	.0156	-.3001	.0070	.0145	.0102	-.0234	.0120	.0087	-.0215	.0025	.0015	-.0019
.599	1.04	.02	.0156	.0082	-.0241	.0156	.0082	-.0241	.0130	.0090	-.0230	.0026	-.0007	-.0011
.600	1.04	-3.02	-.0121	.0088	.0140	-.0122	.0088	.0140	-.0116	.0093	.0128	-.0005	-.0005	.0012
.600	1.04	-.01	.0160	.0087	-.0240	.0160	.0087	-.0240	.0127	.0090	-.0226	.0033	-.0002	-.0014
.600	1.04	3.01	.0445	.0114	-.0632	.0446	.0114	-.0632	.0391	.0109	-.0614	.0054	.0004	-.0018
.600	1.04	5.98	.0759	.0171	-.1085	.0759	.0171	-.1085	.0682	.0158	-.1053	.0077	.0012	-.0032
.600	1.04	8.98	.1069	.0259	-.1540	.1070	.0259	-.1540	.0956	.0236	-.1489	.0114	.0023	-.0051
.601	1.04	-3.02	-.0116	.0088	.0137	-.0116	.0088	.0137	-.0114	.0093	.0124	-.0002	-.0006	.0013
.601	5.56	-3.02	-.0266	-.2779	.0427	-.0127	.0104	.0146	-.0120	.0091	.0133	-.0007	.0013	.0012
.599	5.64	-.02	.0162	-.2854	.0049	.0151	.0101	-.0240	.0126	.0087	-.0224	.0025	.0014	-.0016
.601	5.61	3.00	.0598	-.2791	-.0350	.0434	.0126	-.0636	.0384	.0106	-.0600	.0050	.0020	-.0035
.601	5.57	5.99	.1074	-.2688	-.0822	.0761	.0186	-.1105	.0677	.0155	-.1046	.0085	.0031	-.0059
.600	5.57	8.97	.1526	-.2589	-.1266	.1063	.0271	-.1549	.0958	.0233	-.1490	.0105	.0038	-.0059
.599	1.04	.02	.0161	.0085	-.0241	.0161	.0085	-.0241	.0130	.0090	-.0231	.0031	-.0005	-.0010

Table 10. Aeropropulsive Characteristics for MED Nozzle With Tails Off and $\delta_v = 0°$

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
1.202	.99	.01	-.0033	.0168	-.0008	-.0033	.0168	-.0008	-.0038	.0064	.0035	.0004	.0105	-.0043
1.198	2.01	.00	-.0111	-.0007	.0142	-.0092	.0161	.0088	-.0046	.0065	.0043	-.0045	.0096	.0046
1.200	3.98	-.01	-.0057	-.0307	.0072	-.0058	.0168	.0027	-.0039	.0065	.0036	-.0018	.0103	-.0009
1.200	5.58	.00	-.0069	-.0569	.0114	-.0070	.0165	.0044	-.0040	.0065	.0037	-.0029	.0100	.0006
1.201	7.95	-.01	-.0065	-.0971	.0148	-.0066	.0145	.0041	-.0038	.0065	.0034	-.0027	.0080	.0007
1.199	10.00	-.01	-.0061	-.1320	.0176	-.0062	.0130	.0036	-.0038	.0065	.0033	-.0024	.0065	.0003
1.201	10.99	-.01	-.0055	-.1485	.0185	-.0055	.0121	.0030	-.0037	.0065	.0032	-.0018	.0056	-.0001
1.200	.99	-.01	-.0036	.0174	-.0011	-.0036	.0174	-.0011	-.0038	.0065	.0034	.0002	.0108	-.0045
1.200	.94	6.01	.0296	.0231	-.0255	.0296	.0231	-.0255	.0249	.0096	-.0240	.0048	.0136	-.0014
1.202	2.05	5.99	.0343	.0042	-.0286	.0343	.0217	-.0338	.0253	.0096	-.0245	.0090	.0121	-.0094
1.200	3.98	6.02	.0288	-.0266	-.0094	.0238	.0208	-.0139	.0248	.0095	-.0240	-.0010	.0113	.0101
1.200	5.59	6.01	.0313	-.0530	-.0063	.0235	.0202	-.0133	.0246	.0095	-.0238	-.0010	.0108	.0105
1.201	8.01	6.00	.0360	-.0935	-.0033	.0241	.0184	-.0141	.0247	.0095	-.0239	-.0006	.0089	.0098
1.199	10.04	5.99	.0402	-.1281	-.0010	.0249	.0168	-.0150	.0248	.0095	-.0240	.0001	.0073	.0090
1.201	10.98	5.99	.0422	-.1434	-.0001	.0254	.0161	-.0155	.0249	.0095	-.0241	.0005	.0066	.0086
1.199	.99	-3.00	-.0201	.0193	.0126	-.0202	.0193	.0126	-.0175	.0076	.0158	-.0026	.0117	-.0031
1.201	.98	-.01	-.0020	.0182	-.0024	-.0020	.0182	-.0024	-.0035	.0066	.0030	.0016	.0116	-.0054
1.197	.95	3.02	.0137	.0202	-.0131	.0137	.0202	-.0131	.0107	.0074	-.0103	.0030	.0129	-.0028
1.201	.93	6.02	.0319	.0241	-.0272	.0320	.0241	-.0272	.0254	.0096	-.0247	.0066	.0144	-.0024
1.199	.86	9.02	.0463	.0330	-.0427	.0464	.0330	-.0427	.0354	.0137	-.0365	.0110	.0193	-.0062
1.201	.99	-3.03	-.0203	.0193	.0131	-.0203	.0193	.0131	-.0175	.0076	.0158	-.0028	.0117	-.0027
.599	1.04	.01	-.0030	.0044	.0031	-.0030	.0044	.0031	-.0027	.0059	.0022	-.0003	-.0015	.0009
.599	1.99	.01	-.0140	-.0615	.0327	-.0736	.0046	.0116	-.0042	.0055	.0043	-.0694	-.0008	.0073
.600	2.97	-.01	-.0006	-.1206	.0147	.0001	.0052	.0013	-.0027	.0055	.0022	.0028	-.0003	-.0008
.599	4.01	.00	.0009	-.1875	.0198	.0005	.0055	.0015	-.0027	.0055	.0021	.0032	.0000	-.0006
.600	5.55	-.01	.0023	-.2878	.0285	.0019	.0048	.0005	-.0028	.0054	.0022	.0047	-.0006	-.0017
.600	5.97	-.02	.0026	-.3152	.0309	.0022	.0045	.0003	-.0027	.0054	.0021	.0049	-.0009	-.0018
.600	1.04	-.01	.0012	.0047	.0018	.0012	.0047	.0018	-.0029	.0056	.0023	.0041	-.0009	-.0005
1.200	5.60	-2.99	-.0198	-.0553	.0158	-.0161	.0184	.0088	-.0170	.0075	.0154	.0009	.0109	-.0066
1.200	5.61	.01	-.0034	-.0565	.0101	-.0035	.0175	.0031	-.0035	.0065	.0030	.0000	.0110	.0000
1.201	5.57	3.01	.0131	-.0547	.0039	.0092	.0184	-.0031	.0101	.0072	-.0097	-.0009	.0112	.0066
1.200	5.63	5.99	.0331	-.0530	-.0070	.0253	.0210	-.0141	.0248	.0094	-.0239	.0005	.0115	.0099
1.200	5.63	8.99	.0502	-.0455	-.0196	.0385	.0279	-.0267	.0349	.0135	-.0359	.0037	.0144	.0093
1.198	.98	-.01	-.0017	.0184	-.0023	-.0017	.0184	-.0023	-.0037	.0066	.0033	.0021	.0119	-.0055
.901	1.11	.00	-.0044	.0038	.0043	-.0044	.0038	.0043	-.0044	.0074	.0036	.0000	-.0036	.0007
.899	2.04	.01	-.0106	-.0266	.0192	-.0073	.0040	.0098	-.0052	.0069	.0051	-.0020	-.0029	.0047
.900	3.02	-.05	-.0044	-.0529	.0102	-.0042	.0043	.0044	-.0044	.0069	.0037	.0002	-.0026	.0007
.900	4.04	-.01	-.0035	-.0817	.0119	-.0036	.0048	.0037	-.0043	.0069	.0035	.0006	-.0021	.0002
.902	5.60	-.01	-.0032	-.1262	.0161	-.0034	.0045	.0036	-.0043	.0068	.0035	.0009	-.0023	.0001
.899	7.67	-.01	-.0027	-.1876	.0216	-.0029	.0032	.0033	-.0041	.0066	.0034	.0012	-.0034	-.0001
.899	1.11	-.01	-.0036	.0039	.0039	-.0036	.0039	.0039	-.0043	.0074	.0035	.0007	-.0035	.0004
.902	1.11	6.01	-.0025	.0030	.0081	-.0024	.0030	.0081	-.0066	.0066	.0075	.0041	-.0036	.0006
.902	2.04	5.02	-.0069	-.0279	.0234	-.0067	.0027	.0140	-.0075	.0050	.0090	.0007	-.0033	.0050

Table 10. Continued

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
.901	3.03	5.99	.0023	-.0539	.0145	-.0035	.0032	.0086	-.0064	.0061	.0073	.0029	-.0029	.0013
.901	4.03	6.00	.0055	-.0817	.0162	-.0036	.0035	.0081	-.0063	.0061	.0072	.0027	-.0026	.0008
.901	5.60	6.00	.0104	-.1268	.0201	-.0034	.0033	.0076	-.0062	.0061	.0070	.0028	-.0028	.0006
.900	7.67	6.00	.0170	-.1875	.0251	-.0031	.0020	.0068	-.0057	.0059	.0065	.0026	-.0039	.0003
.901	1.11	-3.02	-.0034	.0040	.0013	-.0034	.0040	.0013	-.0021	.0074	.0009	-.0013	-.0034	.0004
.901	1.11	.02	-.0034	.0039	.0040	-.0034	.0039	.0040	-.0043	.0074	.0036	.0009	-.0036	.0005
.900	1.11	3.02	-.0032	.0035	.0065	-.0032	.0035	.0065	-.0059	.0071	.0058	.0027	-.0036	.0007
.901	1.11	5.99	-.0026	.0029	.0081	-.0026	.0029	.0081	-.0064	.0066	.0073	.0038	-.0037	.0008
.900	1.12	9.01	.0024	.0035	.0066	.0024	.0035	.0066	-.0032	.0069	.0058	.0056	-.0034	.0008
.898	1.11	-3.02	-.0038	.0037	.0016	-.0038	.0037	.0016	-.0024	.0074	.0012	-.0014	-.0037	.0004
.900	5.60	-3.01	-.0101	-.1269	.0141	-.0034	.0041	.0016	-.0022	.0069	.0010	-.0011	-.0027	.0005
.902	5.63	.02	-.0038	-.1275	.0166	-.0040	.0040	.0040	-.0041	.0069	.0034	.0001	-.0029	.0006
.903	5.64	3.00	.0034	-.1276	.0186	-.0036	.0038	.0060	-.0059	.0065	.0058	.0022	-.0028	.0002
.900	5.63	6.00	.0109	-.1277	.0200	-.0030	.0034	.0074	-.0058	.0061	.0067	.0028	-.0027	.0007
.902	5.64	9.00	.0239	-.1259	.0177	.0032	.0042	.0051	-.0030	.0064	.0056	.0061	-.0022	-.0004
.800	1.08	.00	-.0031	.0042	.0038	-.0031	.0042	.0038	-.0033	.0066	.0026	.0003	-.0024	.0011
.799	2.05	.00	-.0119	-.0348	.0236	-.0078	.0043	.0117	-.0045	.0062	.0044	-.0034	-.0020	.0073
.801	3.04	-.02	-.0031	-.0685	.0110	-.0029	.0044	.0035	-.0033	.0063	.0026	.0004	-.0018	.0009
.802	4.04	.00	-.0027	-.1043	.0136	-.0029	.0046	.0033	-.0034	.0063	.0027	.0005	-.0017	.0006
.800	5.55	-.01	-.0021	-.1600	.0186	-.0023	.0043	.0029	-.0033	.0062	.0026	.0009	-.0019	.0003
.800	5.99	-.01	-.0019	-.1763	.0200	-.0021	.0041	.0027	-.0033	.0062	.0027	.0012	-.0021	.0001
.801	7.00	-.02	-.0013	-.2130	.0231	-.0015	.0032	.0023	-.0032	.0061	.0025	.0017	-.0029	-.0001
.801	1.08	.00	-.0025	.0042	.0035	-.0025	.0042	.0035	-.0034	.0065	.0027	.0009	-.0024	.0008
.801	1.08	-3.02	-.0045	.0046	.0027	-.0045	.0046	.0027	-.0046	.0067	.0033	.0001	-.0021	-.0006
.799	1.09	.02	-.0024	.0043	.0035	-.0024	.0043	.0035	-.0034	.0066	.0027	.0010	-.0023	.0009
.799	1.08	3.01	-.0003	.0041	.0044	-.0003	.0041	.0044	-.0022	.0065	.0023	.0019	-.0024	.0021
.801	1.08	5.99	.0011	.0040	.0046	.0011	.0040	.0046	-.0010	.0065	.0016	.0021	-.0025	.0030
.799	1.08	9.00	.0058	.0052	.0016	.0059	.0052	.0016	.0017	.0071	-.0007	.0042	-.0019	.0023
.800	5.59	-3.01	-.0134	-.1610	.0189	-.0049	.0044	.0031	-.0045	.0064	.0032	-.0005	-.0020	-.0001
.802	5.60	.01	-.0019	-.1611	.0186	-.0022	.0042	.0028	-.0032	.0062	.0026	.0011	-.0021	.0003
.801	5.59	3.02	.0092	-.1611	.0187	.0003	.0040	.0029	-.0020	.0061	.0021	.0023	-.0021	.0008
.801	5.59	5.97	.0187	-.1601	.0192	.0013	.0043	.0034	-.0009	.0062	.0016	.0023	-.0019	.0018
.799	5.58	8.96	.0326	-.1583	.0157	.0066	.0053	-.0001	.0019	.0067	-.0008	.0047	-.0014	.0007
.803	1.08	-.01	-.0027	.0041	.0036	-.0027	.0041	.0036	-.0034	.0066	.0027	.0007	-.0025	.0008
.600	1.04	6.01	.0033	.0051	.0019	.0034	.0051	.0019	.0009	.0060	-.0006	.0024	-.0009	.0026
.602	1.98	5.99	-.0017	-.0601	.0309	-.0671	-.0022	.0104	-.0004	.0056	.0015	-.0667	-.0078	.0089
.602	4.01	5.98	.0248	-.1845	.0189	.0046	.0055	.0008	.0010	.0058	-.0007	.0036	-.0003	.0014
.602	5.58	5.99	.0357	-.2858	.0277	.0048	.0045	-.0001	.0011	.0058	-.0006	.0038	-.0013	.0005
.599	5.96	5.98	.0395	-.3135	.0297	.0059	.0043	-.0008	.0012	.0057	-.0007	.0047	-.0014	-.0001
.601	1.04	-2.98	-.0038	.0047	.0031	-.0038	.0047	.0031	-.0047	.0059	.0037	.0009	-.0012	-.0006
.602	1.04	.01	-.0012	.0045	.0030	-.0012	.0045	.0030	-.0026	.0057	.0020	.0014	-.0012	.0010
.603	1.04	3.02	.0008	.0044	.0033	.0008	.0044	.0033	-.0006	.0058	.0005	.0015	-.0014	.0028
.601	1.04	5.99	.0038	.0049	.0021	.0038	.0049	.0021	.0010	.0060	-.0007	.0028	-.0010	.0029

Table 10. Concluded

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
.598	1.04	8.98	.0080	.0062	-.0011	.0080	.0062	-.0011	.0035	.0066	-.0032	.0045	-.0004	.0021
.602	1.04	-3.01	-.0054	.0045	.0038	-.0054	.0045	.0038	-.0047	.0059	.0036	-.0008	-.0015	.0001
.603	5.58	-3.03	-.0193	-.2871	.0310	-.0043	.0039	.0032	-.0045	.0056	.0035	.0002	-.0018	-.0003
.599	5.63	.02	-.0007	-.2948	.0306	-.0012	.0036	.0021	-.0021	.0055	.0015	.0010	-.0019	.0005
.599	5.62	3.02	.0175	-.2934	.0299	.0015	.0037	.0014	-.0004	.0055	.0004	.0019	-.0018	.0011
.598	5.61	5.98	.0366	-.2919	.0283	.0052	.0043	-.0002	.0011	.0057	-.0007	.0041	-.0014	.0005
.602	5.63	9.01	.0559	-.2857	.0246	.0094	.0055	-.0035	.0042	.0065	-.0038	.0052	-.0010	.0003
.599	1.04	.01	-.0018	.0042	.0034	-.0018	.0042	.0034	-.0025	.0057	.0018	.0006	-.0014	.0015

Table 11. Aeropropulsive Characteristics for MED Nozzle With Two Tails and $\delta_v = 0°$

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
1.200	.98	.00	-.0137	.0227	.0151	-.0137	.0227	.0151	-.0124	.0101	.0157	-.0012	.0125	-.0006
1.200	1.95	.03	-.0197	.0058	.0263	-.0346	.0217	.0213	-.0127	.0101	.0160	-.0219	.0115	.0053
1.199	4.00	.01	-.0136	-.0255	.0173	-.0137	.0224	.0128	-.0125	.0102	.0160	-.0012	.0123	-.0033
1.203	5.63	.01	-.0137	-.0523	.0200	-.0138	.0216	.0129	-.0127	.0101	.0164	-.0011	.0115	-.0035
1.201	7.95	-.01	-.0136	-.0918	.0237	-.0137	.0197	.0130	-.0127	.0101	.0164	-.0010	.0096	-.0033
1.199	9.97	-.01	-.0134	-.1264	.0265	-.0135	.0181	.0127	-.0126	.0101	.0162	-.0009	.0080	-.0035
1.202	11.01	-.01	-.0136	-.1435	.0287	-.0137	.0172	.0133	-.0130	.0101	.0167	-.0007	.0071	-.0035
1.200	.97	.01	-.0156	.0229	.0165	-.0156	.0229	.0165	-.0128	.0101	.0164	-.0028	.0128	.0001
1.201	.98	-3.01	-.0499	.0250	.0552	-.0499	.0250	.0552	-.0454	.0121	.0577	-.0045	.0129	-.0025
1.199	.97	.02	-.0146	.0233	.0159	-.0146	.0233	.0159	-.0122	.0102	.0156	-.0024	.0131	.0003
1.203	.93	3.02	.0160	.0247	-.0176	.0161	.0247	-.0176	.0190	.0115	-.0242	-.0030	.0133	.0066
1.199	.92	5.98	.0460	.0289	-.0503	.0461	.0289	-.0503	.0463	.0153	-.0588	-.0002	.0136	.0085
1.202	.89	8.99	.0625	.0378	-.0682	.0625	.0378	-.0682	.0540	.0197	-.0668	.0085	.0181	-.0014
1.201	.97	-2.99	-.0496	.0253	.0558	-.0497	.0253	.0558	-.0458	.0122	.0583	-.0039	.0131	-.0026
1.202	5.62	-3.00	-.0523	-.0500	.0617	-.0486	.0238	.0546	-.0459	.0121	.0586	-.0027	.0117	-.0039
1.200	5.62	.02	-.0114	-.0518	.0189	-.0116	.0224	.0118	-.0122	.0101	.0158	.0006	.0122	-.0039
1.197	5.58	3.01	.0269	-.0493	-.0210	.0230	.0243	-.0281	.0197	.0115	-.0248	.0032	.0128	-.0033
1.200	5.58	5.98	.0611	-.0449	-.0541	.0534	.0281	-.0611	.0464	.0152	-.0586	.0071	.0129	-.0025
1.201	5.59	8.98	.0729	-.0373	-.0577	.0614	.0353	-.0647	.0540	.0196	-.0668	.0074	.0156	.0021
1.202	.97	-.03	-.0150	.0237	.0176	-.0150	.0237	.0176	-.0139	.0101	.0179	-.0011	.0136	-.0003
.899	1.11	-.02	-.0018	.0075	-.0029	-.0018	.0075	-.0029	.0006	.0108	-.0071	-.0023	-.0033	.0042
.903	1.98	.03	-.0065	-.0215	.0087	-.0327	.0072	-.0004	-.0003	.0099	-.0055	-.0324	-.0028	.0051
.902	3.03	.01	-.0010	-.0493	.0017	-.0009	.0078	-.0041	.0006	.0101	-.0071	-.0014	-.0023	.0030
.901	4.01	-.03	.0003	-.0772	.0023	.0002	.0082	-.0059	.0009	.0100	-.0076	-.0007	-.0018	.0018
.898	5.55	-.02	.0018	-.1225	.0045	.0017	.0078	-.0079	.0019	.0098	-.0091	-.0002	-.0020	.0012
.902	7.69	.00	.0023	-.1841	.0101	.0021	.0064	-.0082	.0012	.0096	-.0081	.0009	-.0032	-.0001
.900	1.11	.02	-.0012	.0074	-.0025	-.0012	.0074	-.0025	.0002	.0108	-.0064	-.0015	-.0034	.0039
.901	1.11	-3.00	-.0127	.0077	.0133	-.0127	.0077	.0133	-.0103	.0109	.0095	-.0025	-.0032	.0038
.901	1.11	-.01	-.0003	.0077	-.0029	-.0003	.0077	-.0029	.0003	.0108	-.0065	-.0006	-.0031	.0037
.899	1.10	3.01	.0095	.0079	-.0151	.0095	.0079	-.0151	.0084	.0109	-.0189	.0011	-.0030	.0038
.898	1.10	6.01	.0172	.0088	-.0259	.0173	.0088	-.0259	.0160	.0116	-.0302	.0012	-.0028	.0043
.900	1.12	8.99	.0278	.0109	-.0350	.0279	.0109	-.0350	.0207	.0133	-.0358	.0072	-.0024	.0008
.900	1.11	-3.01	-.0129	.0073	.0129	-.0130	.0073	.0129	-.0100	.0108	.0089	-.0030	-.0035	.0040
.901	5.58	-3.02	-.0176	-.1223	.0226	-.0110	.0079	.0101	-.0090	.0099	.0074	-.0020	-.0020	.0027
.901	5.64	-.01	.0019	-.1238	.0051	.0018	.0082	-.0075	.0012	.0100	-.0081	.0006	-.0018	.0007
.901	5.64	2.99	.0185	-.1230	-.0078	.0115	.0086	-.0203	.0088	.0102	-.0196	.0027	-.0016	-.0007
.897	5.61	5.99	.0341	-.1219	-.0197	.0201	.0096	-.0323	.0175	.0110	-.0321	.0027	-.0014	-.0002
.904	5.64	9.02	.0485	-.1181	-.0234	.0278	.0115	-.0359	.0192	.0124	-.0333	.0086	-.0009	-.0026
.796	1.08	.02	.0061	.0060	-.0112	.0061	.0060	-.0112	.0064	.0083	-.0134	-.0003	-.0023	.0022
.798	1.95	.02	-.0014	-.0298	.0065	-.0351	.0060	-.0048	.0042	.0078	-.0098	-.0392	-.0018	.0050
.800	3.02	.00	.0063	-.0657	-.0039	.0065	.0065	-.0113	.0060	.0079	-.0126	.0006	-.0014	.0013
.803	3.97	.00	.0071	-.0992	-.0019	.0069	.0068	-.0120	.0062	.0079	-.0130	.0007	-.0011	.0010
.800	5.63	.01	.0072	-.1607	.0043	.0070	.0062	-.0117	.0058	.0078	-.0123	.0011	-.0015	.0006

Table 11. Concluded

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
.798	6.03	.01	.0077	-.1763	.0053	.0074	.0060	-.0121	.0059	.0077	-.0124	.0015	-.0017	.0003
.802	6.96	.00	.0078	-.2090	.0085	.0076	.0055	-.0121	.0056	.0077	-.0119	.0020	-.0022	-.0001
.799	1.08	.00	.0078	.0062	-.0121	.0078	.0062	-.0121	.0063	.0083	-.0133	.0014	-.0021	.0012
.802	1.08	-3.02	-.0077	.0068	.0074	-.0077	.0068	.0074	-.0076	.0085	.0060	-.0001	-.0018	.0015
.800	1.08	-.01	.0087	.0065	-.0125	.0087	.0065	-.0125	.0064	.0083	-.0134	.0022	-.0018	.0009
.800	1.08	3.02	.0229	.0076	-.0298	.0230	.0076	-.0298	.0196	.0093	-.0316	.0033	-.0016	.0018
.601	1.08	5.99	.0357	.0100	-.0458	.0357	.0100	-.0458	.0313	.0114	-.0482	.0044	-.0014	.0025
.800	1.08	9.00	.0450	.0134	-.0562	.0450	.0134	-.0562	.0380	.0142	-.0575	.0070	-.0008	.0014
.799	1.08	-.02	.0079	.0062	-.0120	.0079	.0062	-.0120	.0063	.0083	-.0133	.0016	-.0021	.0013
.601	1.04	.02	.0066	.0063	-.0085	.0066	.0063	-.0085	.0043	.0074	-.0088	.0023	-.0012	.0002
.601	1.98	.02	-.0067	-.0584	.0225	-.0658	.0064	.0019	.0020	.0071	-.0052	-.0677	-.0006	.0071
.600	3.00	-.02	.0065	-.1203	.0043	.0070	.0067	-.0088	.0039	.0071	-.0082	.0031	-.0005	-.0006
.600	3.96	-.02	.0073	-.1824	.0092	.0071	.0070	-.0089	.0040	.0071	-.0083	.0030	-.0001	-.0005
.599	5.59	-.02	.0072	-.2891	.0195	.0069	.0058	-.0087	.0039	.0071	-.0079	.0030	-.0013	-.0008
.600	5.96	-.03	.0075	-.3124	.0213	.0072	.0056	-.0091	.0038	.0071	-.0076	.0035	-.0015	-.0015
.600	1.04	.01	.0076	.0065	-.0087	.0076	.0065	-.0087	.0040	.0074	-.0084	.0036	-.0009	-.0003
.600	1.04	-3.02	-.0077	.0069	.0102	-.0077	.0069	.0102	-.0093	.0078	.0095	.0016	-.0008	.0007
.599	1.04	.00	.0079	.0068	-.0087	.0079	.0068	-.0087	.0040	.0074	-.0083	.0039	-.0006	-.0004
.600	1.04	3.01	.0230	.0078	-.0275	.0231	.0078	-.0275	.0184	.0082	-.0278	.0046	-.0004	.0003
.599	1.04	5.97	.0374	.0102	-.0454	.0374	.0103	-.0454	.0315	.0105	-.0457	.0059	-.0003	.0004
.603	1.04	8.99	.0472	.0140	-.0575	.0472	.0140	-.0575	.0397	.0136	-.0572	.0075	.0004	-.0002
.603	1.04	-3.01	-.0093	.0064	.0110	-.0093	.0064	.0110	-.0093	.0078	.0096	.0000	-.0014	.0014
.599	5.56	-3.02	-.0242	-.2866	.0398	-.0092	.0064	.0117	-.0098	.0075	.0105	.0006	-.0011	.0012
.600	5.60	.01	.0071	-.2894	.0197	.0066	.0057	-.0085	.0040	.0072	-.0080	.0026	-.0015	-.0005
.600	5.59	3.01	.0384	-.2870	.0000	.0226	.0070	-.0281	.0179	.0080	-.0269	.0047	-.0010	-.0013
.601	5.58	5.98	.0631	-.2817	-.0187	.0372	.0100	-.0467	.0311	.0103	-.0450	.0061	-.0002	-.0017
.603	5.60	9.00	.0935	-.2748	-.0311	.0475	.0134	-.0590	.0392	.0133	-.0563	.0083	.0001	-.0027
.600	1.04	.01	.0063	.0060	-.0079	.0063	.0060	-.0079	.0042	.0075	-.0086	.0020	-.0015	.0007

Table 12. Aeropropulsive Characteristics for MED Nozzle With Three Tails and $\delta_v = 0°$

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
1.200	.96	-.02	-.0038	.0253	-.0007	-.0038	.0253	-.0007	-.0036	.0120	.0017	-.0002	.0133	-.0025
1.198	1.97	.02	-.0088	.0078	.0101	-.0237	.0239	.0050	-.0035	.0121	.0015	-.0202	.0118	.0035
1.199	4.04	-.02	-.0038	-.0241	.0031	-.0039	.0246	-.0015	-.0033	.0121	.0015	-.0006	.0125	-.0030
1.199	5.61	-.02	-.0038	-.0503	.0057	-.0039	.0238	-.0014	-.0034	.0121	.0016	-.0005	.0116	-.0030
1.201	8.03	.00	-.0042	-.0910	.0100	-.0042	.0217	-.0009	-.0037	.0121	.0020	-.0006	.0097	-.0028
1.201	10.01	.01	-.0035	-.1243	.0122	-.0037	.0203	-.0017	-.0032	.0121	.0012	-.0005	.0082	-.0029
1.201	10.97	-.01	-.0037	-.1406	.0140	-.0038	.0196	-.0014	-.0036	.0121	.0018	-.0002	.0076	-.0032
1.199	.96	.01	-.0034	.0258	-.0024	-.0034	.0258	-.0024	-.0026	.0122	.0002	-.0009	.0136	-.0026
1.198	.97	-3.00	-.0475	.0274	.0555	-.0476	.0274	.0555	-.0418	.0142	.0551	-.0057	.0132	.0005
1.201	.96	.00	-.0024	.0261	-.0035	-.0024	.0261	-.0035	-.0021	.0122	-.0005	-.0003	.0139	-.0030
1.200	.95	3.02	.0406	.0285	-.0588	.0406	.0285	-.0588	.0367	.0142	-.0546	.0039	.0142	-.0042
1.201	.91	5.97	.0705	.0354	-.0941	.0705	.0354	-.0941	.0632	.0195	-.0919	.0074	.0160	-.0022
1.200	.88	7.97	.0959	.0425	-.1310	.0959	.0425	-.1310	.0848	.0250	-.1255	.0111	.0175	-.0056
1.201	.97	-2.99	-.0473	.0274	.0551	-.0473	.0274	.0551	-.0416	.0141	.0548	-.0057	.0133	.0002
1.201	5.59	-2.98	-.0526	-.0472	.0661	-.0489	.0262	.0590	-.0422	.0142	.0558	-.0067	.0120	.0033
1.201	5.60	.00	-.0010	-.0491	.0029	-.0011	.0245	-.0041	-.0020	.0122	-.0005	.0009	.0123	-.0036
1.199	5.62	3.00	.0480	-.0472	-.0565	.0440	.0269	-.0636	.0368	.0142	-.0547	.0072	.0127	-.0089
1.199	5.60	5.97	.0866	-.0388	-.1001	.0788	.0347	-.1071	.0637	.0196	-.0925	.0152	.0151	-.0146
1.201	5.62	5.65	.0617	-.0401	-.0938	.0744	.0334	-.1009	.0602	.0187	-.0872	.0142	.0147	-.0136
1.200	.95	.00	-.0022	.0264	-.0028	-.0022	.0264	-.0028	-.0028	.0122	.0005	.0006	.0142	-.0033
.901	1.11	-.01	.0025	.0086	-.0104	.0025	.0086	-.0104	.0037	.0113	-.0123	-.0012	-.0027	.0019
.900	1.99	.01	-.0033	-.0211	.0040	-.0296	.0081	-.0053	.0020	.0101	-.0093	-.0316	-.0020	.0041
.901	2.99	.00	.0028	-.0475	-.0043	.0030	.0087	-.0101	.0034	.0104	-.0118	-.0005	-.0016	.0017
.901	4.03	.01	.0045	-.0770	-.0036	.0043	.0091	-.0118	.0037	.0104	-.0122	.0006	-.0013	.0005
.901	5.63	-.01	.0044	-.1233	.0008	.0042	.0086	-.0118	.0034	.0102	-.0118	.0008	-.0016	.0001
.899	7.67	-.02	.0052	-.1837	.0056	.0051	.0073	-.0127	.0037	.0097	-.0122	.0014	-.0024	-.0005
.899	1.11	.01	.0041	.0085	-.0110	.0041	.0085	-.0110	.0037	.0112	-.0124	.0004	-.0027	.0014
.898	1.11	-3.00	-.0057	.0083	.0036	-.0057	.0083	.0036	-.0041	.0112	.0014	-.0015	-.0029	.0022
.901	1.11	-.01	.0045	.0086	-.0111	.0045	.0086	-.0111	.0035	.0113	-.0121	.0010	-.0026	.0010
.903	1.11	3.02	.0176	.0094	-.0303	.0176	.0094	-.0303	.0145	.0116	-.0311	.0030	-.0022	.0008
.900	1.11	6.00	.0379	.0117	-.0623	.0380	.0117	-.0623	.0342	.0138	-.0632	.0037	-.0021	.0009
.902	1.12	8.98	.0808	.0197	-.1161	.0809	.0198	-.1161	.0657	.0198	-.1113	.0152	.0000	-.0048
.898	1.11	-3.02	-.0060	.0082	.0038	-.0060	.0082	.0038	-.0042	.0112	.0015	-.0018	-.0029	.0024
.901	5.60	-3.02	-.0120	-.1223	.0156	-.0053	.0086	.0031	-.0041	.0102	.0015	-.0012	-.0017	.0015
.901	5.59	-.01	.0057	-.1217	.0001	.0055	.0089	-.0124	.0033	.0102	-.0117	.0022	-.0013	-.0006
.901	5.59	3.01	.0273	-.1204	-.0223	.0203	.0100	-.0348	.0157	.0106	-.0325	.0047	-.0007	-.0023
.901	5.59	6.00	.0540	-.1174	-.0535	.0402	.0124	-.0660	.0347	.0130	-.0637	.0054	-.0006	-.0023
.901	5.59	8.98	.1036	-.1083	-.1074	.0831	.0206	-.1198	.0660	.0190	-.1113	.0171	.0016	-.0086
.799	1.08	.00	.0063	.0072	-.0120	.0063	.0072	-.0120	.0056	.0088	-.0137	.0006	-.0015	.0017
.803	1.99	.01	-.0022	-.0293	.0074	-.0354	.0072	-.0042	.0031	.0082	-.0095	-.0384	-.0010	.0053
.805	3.00	-.03	.0062	-.0631	-.0046	.0065	.0076	-.0119	.0054	.0084	-.0132	.0011	-.0007	.0014
.801	4.04	-.02	.0071	-.1012	-.0022	.0070	.0078	-.0126	.0053	.0083	-.0132	.0016	-.0005	.0006
.800	5.59	-.01	.0073	-.1582	.0029	.0071	.0073	-.0130	.0054	.0082	-.0133	.0017	-.0009	.0003

Table 12. Concluded

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
.799	6.01	-.01	.0074	-.1742	.0044	.0072	.0072	-.0129	.0053	.0082	-.0130	.0019	-.0010	.0001
.801	7.00	-.02	.0075	-.2101	.0077	.0074	.0064	-.0130	.0051	.0081	-.0128	.0023	-.0017	-.0002
.800	1.08	.00	.0066	.0070	-.0122	.0066	.0070	-.0122	.0057	.0088	-.0139	.0009	-.0018	.0017
.800	1.08	-3.02	-.0104	.0075	.0114	-.0104	.0075	.0114	-.0091	.0092	.0089	-.0013	-.0016	.0026
.800	1.08	-.02	.0078	.0073	-.0131	.0078	.0073	-.0131	.0061	.0088	-.0144	.0017	-.0015	.0013
.800	1.08	3.01	.0260	.0086	-.0390	.0260	.0086	-.0390	.0229	.0099	-.0402	.0031	-.0013	.0012
.802	1.08	5.99	.0508	.0122	-.0760	.0508	.0122	-.0760	.0460	.0132	-.0766	.0048	-.0010	.0006
.801	1.08	8.98	.0797	.0191	-.1171	.0798	.0191	-.1171	.0711	.0193	-.1158	.0087	-.0002	-.0013
.800	1.08	-.01	.0057	.0069	-.0118	.0057	.0069	-.0118	.0059	.0088	-.0141	-.0002	-.0019	.0022
.600	1.04	.01	.0063	.0070	-.0116	.0063	.0070	-.0116	.0056	.0080	-.0126	.0007	-.0010	.0010
.601	2.04	.01	-.0103	-.0612	.0262	-.0030	.0078	.0050	.0019	.0076	-.0065	-.0049	.0002	.0115
.600	2.99	-.02	.0070	-.1190	.0012	.0075	.0076	-.0120	.0049	.0077	-.0115	.0026	.0000	-.0005
.601	4.00	-.01	.0082	-.1835	.0057	.0079	.0079	-.0125	.0054	.0077	-.0122	.0025	.0002	-.0003
.600	5.57	-.02	.0087	-.2865	.0151	.0084	.0070	-.0129	.0051	.0076	-.0117	.0033	-.0006	-.0012
.600	5.97	-.02	.0088	-.3119	.0175	.0085	.0068	-.0130	.0050	.0076	-.0115	.0035	-.0008	-.0015
.600	1.04	-.02	.0081	.0073	-.0120	.0061	.0073	-.0120	.0054	.0079	-.0122	.0027	-.0006	.0003
.599	1.04	-3.01	-.0121	.0078	.0158	-.0121	.0078	.0158	-.0116	.0085	.0137	-.0003	-.0007	.0020
.600	1.04	.00	.0085	.0075	-.0125	.0085	.0075	-.0125	.0057	.0079	-.0127	.0028	-.0004	.0002
.601	1.04	3.02	.0294	.0093	-.0413	.0294	.0093	-.0413	.0242	.0091	-.0405	.0051	.0002	-.0008
.599	1.04	5.99	.0559	.0133	-.0797	.0560	.0133	-.0797	.0480	.0125	-.0771	.0080	.0008	-.0027
.597	1.04	8.97	.0853	.0210	-.1244	.0854	.0210	-.1244	.0755	.0191	-.1201	.0099	.0019	-.0043
.602	1.04	-3.01	-.0126	.0073	.0160	-.0126	.0073	.0160	-.0117	.0085	.0135	-.0010	-.0011	.0025
.600	5.60	-3.01	-.0270	-.2876	.0446	-.0119	.0070	.0164	-.0126	.0082	.0151	.0007	-.0011	.0013
.600	5.60	.00	.0098	-.2885	.0145	.0093	.0066	-.0137	.0056	.0076	-.0124	.0037	-.0010	-.0013
.599	5.62	3.01	.0462	-.2881	-.0154	.0302	.0087	-.0438	.0246	.0088	-.0411	.0054	-.0002	-.0027
.601	5.60	5.97	.0879	-.2798	-.0545	.0569	.0128	-.0826	.0485	.0123	-.0778	.0084	.0005	-.0048
.599	5.59	8.96	.1329	-.2716	-.0987	.0866	.0203	-.1269	.0761	.0189	-.1208	.0105	.0014	-.0061
.601	1.04	-.01	.0073	.0072	-.0115	.0073	.0072	-.0115	.0053	.0079	-.0121	.0020	-.0007	.0005

Table 13. Aeropropulsive Characteristics for MED Nozzle With Four Tails and $\delta_v = 0°$

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
1.201	.95	.00	-.0094	.0283	.0078	-.0094	.0283	.0078	-.0085	.0144	.0082	-.0009	.0139	-.0004
1.201	1.95	.01	-.0138	.0111	.0177	-.0286	.0269	.0126	-.0091	.0144	.0090	-.0195	.0124	.0036
1.201	4.01	-.01	-.0074	-.0204	.0078	-.0075	.0276	.0032	-.0091	.0144	.0092	.0016	.0132	-.0060
1.200	5.60	-.03	-.0072	-.0470	.0098	-.0072	.0268	.0028	-.0093	.0144	.0095	.0021	.0124	-.0067
1.200	7.94	-.03	-.0075	-.0868	.0143	-.0075	.0248	.0036	-.0093	.0144	.0096	.0018	.0104	-.0060
1.200	9.95	-.01	-.0071	-.1206	.0171	-.0072	.0234	.0033	-.0089	.0144	.0090	.0017	.0090	-.0057
1.199	10.99	-.02	-.0072	-.1385	.0191	-.0072	.0226	.0036	-.0091	.0144	.0094	.0019	.0082	-.0057
1.199	.95	-.01	-.0097	.0288	.0082	-.0097	.0288	.0082	-.0089	.0145	.0087	-.0008	.0143	-.0005
1.199	.98	-3.01	-.0619	.0300	.0759	-.0619	.0300	.0759	-.0570	.0165	.0760	-.0049	.0135	-.0001
1.201	.95	.01	-.0081	.0289	.0062	-.0081	.0289	.0062	-.0074	.0145	.0067	-.0007	.0144	-.0004
1.201	.92	3.00	.0447	.0323	-.0634	.0447	.0323	-.0634	.0410	.0173	-.0613	.0037	.0150	-.0021
1.199	.87	5.98	.0796	.0394	-.1064	.0796	.0394	-.1064	.0719	.0228	-.1058	.0077	.0166	-.0007
1.199	.86	7.42	.0985	.0445	-.1341	.0985	.0445	-.1341	.0881	.0269	-.1308	.0104	.0175	-.0033
1.199	.97	-2.99	-.0624	.0301	.0766	-.0624	.0301	.0766	-.0575	.0165	.0768	-.0049	.0136	-.0002
1.201	5.59	-3.00	-.0654	-.0447	.0836	-.0617	.0287	.0766	-.0572	.0165	.0764	-.0045	.0122	.0001
1.198	5.57	.00	-.0041	-.0462	.0067	-.0042	.0273	-.0003	-.0072	.0146	.0067	.0030	.0128	-.0070
1.199	5.58	2.99	.0551	-.0429	-.0672	.0512	.0306	-.0743	.0410	.0174	-.0608	.0102	.0133	-.0135
1.200	5.62	4.96	.0932	-.0386	-.1141	.0867	.0352	-.1212	.0699	.0214	-.1024	.0168	.0138	-.0188
1.200	.94	-.01	-.0092	.0290	.0084	-.0092	.0290	.0084	-.0089	.0144	.0088	-.0002	.0145	-.0004
.599	1.04	-.01	.0141	.0087	-.0226	.0141	.0087	-.0226	.0131	.0094	-.0229	.0009	-.0007	.0003
.602	2.04	.01	-.0023	-.0592	.0160	.0050	.0093	-.0051	.0078	.0089	-.0147	-.0028	.0004	.0096
.600	3.00	-.03	.0156	-.1184	-.0096	.0161	.0092	-.0227	.0123	.0090	-.0216	.0038	.0002	-.0012
.602	4.01	-.03	.0169	-.1818	-.0047	.0166	.0097	-.0229	.0122	.0090	-.0214	.0045	.0007	-.0014
.601	5.60	-.04	.0179	-.2848	.0045	.0177	.0086	-.0235	.0123	.0089	-.0216	.0053	-.0003	-.0019
.602	5.96	-.03	.0185	-.3077	.0064	.0182	.0084	-.0238	.0123	.0089	-.0215	.0059	-.0006	-.0023
.602	1.04	-.03	.0182	.0088	-.0237	.0182	.0088	-.0237	.0129	.0092	-.0226	.0053	-.0005	-.0011
.601	1.04	-3.02	-.0098	.0090	.0148	-.0099	.0090	.0148	-.0116	.0096	.0132	.0018	-.0006	.0015
.600	1.04	.00	.0187	.0092	-.0240	.0187	.0092	-.0240	.0131	.0092	-.0228	.0057	-.0001	-.0012
.600	1.04	2.99	.0461	.0116	-.0621	.0461	.0116	-.0621	.0384	.0111	-.0600	.0077	.0004	-.0022
.599	1.04	5.98	.0775	.0173	-.1082	.0775	.0173	-.1082	.0679	.0159	-.1048	.0096	.0014	-.0034
.602	1.04	8.95	.1083	.0258	-.1547	.1084	.0258	-.1547	.0965	.0236	-.1501	.0118	.0021	-.0046
.599	1.04	-3.03	-.0104	.0087	.0150	-.0104	.0087	.0150	-.0114	.0096	.0129	.0010	-.0009	.0020
.600	5.60	-3.04	-.0262	-.2860	.0447	-.0110	.0085	.0165	-.0128	.0093	.0150	.0017	-.0008	.0015
.600	5.58	-.03	.0173	-.2852	.0052	.0171	.0085	-.0229	.0121	.0089	-.0212	.0049	-.0005	-.0017
.600	5.57	3.00	.0621	-.2822	-.0359	.0463	.0110	-.0639	.0385	.0108	-.0600	.0079	.0002	-.0039
.597	5.56	5.97	.1094	-.2773	-.0825	.0784	.0164	-.1108	.0681	.0155	-.1049	.0103	.0009	-.0059
.599	5.57	8.95	.1558	-.2651	-.1295	.1098	.0251	-.1576	.0969	.0233	-.1503	.0129	.0017	-.0072
.600	1.04	-.01	.0158	.0081	-.0218	.0158	.0081	-.0218	.0123	.0092	-.0217	.0035	-.0011	-.0001
.901	1.10	.00	.0096	.0120	-.0184	.0096	.0120	-.0184	.0082	.0140	-.0199	.0014	-.0020	.0014
.900	2.03	-.01	.0057	-.0192	-.0084	.0090	.0112	-.0179	.0083	.0126	-.0196	.0007	-.0014	.0018
.901	3.02	-.02	.0110	-.0451	-.0161	.0112	.0120	-.0220	.0092	.0130	-.0213	.0020	-.0010	-.0007
.901	4.00	.00	.0123	-.0727	-.0157	.0121	.0124	-.0238	.0093	.0130	-.0216	.0028	-.0006	-.0022
.900	5.58	-.03	.0122	-.1186	-.0116	.0121	.0118	-.0241	.0090	.0128	-.0211	.0031	-.0010	-.0030

Table 13. Concluded

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
.900	7.73	-.03	.0125	-.1822	-.0064	.0125	.0100	-.0248	.0091	.0123	-.0213	.0033	-.0023	-.0035
.900	1.10	-.01	.0087	.0118	-.0187	.0087	.0118	-.0187	.0086	.0139	-.0203	.0001	-.0021	.0016
.902	1.11	-3.03	-.0064	.0113	.0030	-.0065	.0113	.0030	-.0051	.0139	.0013	-.0014	-.0026	.0017
.900	1.10	-.02	.0090	.0120	-.0194	.0090	.0120	-.0194	.0090	.0139	-.0209	.0000	-.0019	.0016
.895	1.09	2.98	.0278	.0132	-.0474	.0278	.0132	-.0474	.0264	.0145	-.0487	.0014	-.0013	.0013
.901	1.09	6.00	.0453	.0160	-.0745	.0453	.0160	-.0745	.0432	.0168	-.0763	.0021	-.0009	.0018
.899	1.09	7.96	.0690	.0201	-.1076	.0691	.0201	-.1076	.0635	.0204	-.1081	.0056	-.0003	.0004
.898	1.11	-3.04	-.0065	.0110	.0026	-.0065	.0110	.0026	-.0050	.0135	.0010	-.0015	-.0026	.0016
.900	5.63	-3.02	-.0119	-.1208	.0131	-.0052	.0109	.0005	-.0046	.0125	.0005	-.0005	-.0016	.0000
.898	5.58	-.04	.0124	-.1196	-.0124	.0123	.0116	-.0249	.0098	.0127	-.0223	.0025	-.0011	-.0026
.897	5.56	2.98	.0388	-.1174	-.0422	.0318	.0134	-.0547	.0274	.0138	-.0504	.0044	-.0004	-.0043
.899	5.63	5.99	.0670	-.1148	-.0756	.0531	.0166	-.0882	.0471	.0166	-.0825	.0060	.0000	-.0057
.901	5.64	7.96	.0940	-.1098	-.1060	.0756	.0209	-.1187	.0650	.0200	-.1106	.0105	.0009	-.0081
.798	1.08	-.03	.0161	.0081	-.0269	.0161	.0081	-.0269	.0156	.0103	-.0284	.0005	-.0021	.0016
.799	2.00	.00	.0067	-.0290	-.0057	.0110	.0086	-.0178	.0123	.0096	-.0230	-.0013	-.0011	.0052
.802	3.01	-.01	.0163	-.0626	-.0193	.0166	.0088	-.0267	.0152	.0098	-.0278	.0014	-.0010	.0011
.801	3.98	-.01	.0169	-.0974	-.0168	.0167	.0093	-.0270	.0151	.0098	-.0275	.0017	-.0005	.0005
.802	5.65	-.01	.0170	-.1583	-.0110	.0168	.0087	-.0269	.0149	.0097	-.0272	.0019	-.0010	.0002
.802	6.01	-.01	.0174	-.1714	-.0101	.0172	.0084	-.0273	.0149	.0097	-.0273	.0023	-.0012	-.0001
.801	7.00	-.01	.0166	-.2082	-.0059	.0166	.0078	-.0266	.0145	.0096	-.0265	.0022	-.0017	-.0001
.800	1.08	-.01	.0176	.0085	-.0280	.0176	.0085	-.0280	.0161	.0103	-.0292	.0015	-.0018	.0012
.803	1.08	-3.03	-.0081	.0086	.0073	-.0081	.0086	.0073	-.0069	.0104	.0048	-.0012	-.0018	.0024
.800	1.08	-.04	.0182	.0087	-.0285	.0182	.0087	-.0285	.0163	.0103	-.0295	.0019	-.0016	.0010
.802	1.08	3.00	.0440	.0111	-.0642	.0440	.0111	-.0642	.0403	.0124	-.0652	.0037	-.0013	.0010
.798	1.08	5.97	.0727	.0160	-.1068	.0728	.0160	-.1068	.0678	.0169	-.1079	.0050	-.0010	.0011
.800	1.08	8.96	.1031	.0241	-.1514	.1031	.0241	-.1514	.0940	.0244	-.1501	.0092	-.0002	-.0013
.800	1.08	-.04	.0166	.0084	-.0272	.0166	.0084	-.0272	.0158	.0103	-.0287	.0008	-.0019	.0015

Table 14. Aeropropulsive Characteristics for HI Nozzle With Tails Off and $\delta_v = 0°$

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
1.199	.97	-.02	-.0049	.0185	.0033	-.0049	.0185	.0033	-.0044	.0054	.0041	-.0005	.0132	-.0008
1.199	2.01	-.02	-.0129	.0004	.0179	-.0119	.0168	.0142	-.0046	.0055	.0042	-.0073	.0114	.0100
1.200	3.98	-.04	-.0054	-.0296	.0067	-.0058	.0172	.0027	-.0041	.0054	.0037	-.0016	.0117	-.0011
1.201	5.63	-.03	-.0055	-.0565	.0097	-.0062	.0169	.0034	-.0040	.0054	.0036	-.0023	.0115	-.0002
1.199	8.01	-.05	-.0054	-.0971	.0135	-.0064	.0150	.0040	-.0040	.0054	.0036	-.0024	.0096	.0004
1.200	9.99	-.03	-.0052	-.1306	.0165	-.0066	.0132	.0044	-.0038	.0054	.0034	-.0028	.0078	.0010
1.201	10.92	-.05	-.0053	-.1464	.0180	-.0069	.0123	.0046	-.0041	.0054	.0035	-.0028	.0069	.0010
1.200	.96	-.04	-.0046	.0191	.0005	-.0046	.0191	.0005	-.0040	.0055	.0036	-.0005	.0136	-.0031
1.200	.87	5.98	.0337	.0264	-.0343	.0338	.0264	-.0343	.0242	.0090	-.0237	.0096	.0174	-.0106
1.201	2.00	5.99	.0251	.0050	-.0124	.0245	.0213	-.0160	.0238	.0089	-.0232	.0007	.0124	.0072
1.199	3.99	5.99	.0311	-.0245	-.0153	.0259	.0221	-.0193	.0240	.0089	-.0236	.0019	.0133	.0043
1.200	5.63	5.98	.0329	-.0510	-.0106	.0246	.0219	-.0169	.0240	.0088	-.0236	.0007	.0131	.0067
1.201	8.03	5.96	.0366	-.0915	-.0063	.0239	.0198	-.0158	.0239	.0088	-.0235	.0000	.0110	.0077
1.201	10.05	5.99	.0399	-.1259	-.0026	.0233	.0178	-.0148	.0237	.0087	-.0231	-.0003	.0090	.0083
1.200	10.91	5.99	.0418	-.1409	-.0016	.0236	.0168	-.0150	.0237	.0087	-.0232	-.0001	.0080	.0082
1.201	.95	-3.03	-.0234	.0204	.0183	-.0235	.0204	.0183	-.0180	.0065	.0164	-.0054	.0139	.0019
1.200	.95	-.01	-.0042	.0195	.0018	-.0042	.0195	.0018	-.0036	.0055	.0032	-.0005	.0140	-.0015
1.199	.93	2.99	.0152	.0210	-.0159	.0152	.0210	-.0159	.0107	.0062	-.0101	.0044	.0148	-.0058
1.201	.86	5.96	.0356	.0271	-.0358	.0357	.0271	-.0358	.0244	.0090	-.0239	.0112	.0181	-.0119
1.202	.83	8.98	.0505	.0345	-.0502	.0506	.0345	-.0502	.0362	.0126	-.0370	.0144	.0219	-.0132
1.201	.95	-3.04	-.0235	.0207	.0192	-.0235	.0207	.0192	-.0180	.0066	.0164	-.0055	.0141	.0028
.600	1.04	.00	-.0030	.0051	.0020	-.0030	.0051	.0020	-.0017	.0050	.0006	-.0013	.0000	.0014
.600	2.00	-.04	-.0138	-.0597	.0308	-.0094	.0053	.0162	-.0036	.0047	.0034	-.0058	.0006	.0128
.600	2.98	-.03	-.0005	-.1179	.0118	-.0011	.0053	.0011	-.0017	.0048	.0006	.0005	.0005	.0005
.601	3.98	-.05	.0012	-.1813	.0158	-.0002	.0059	-.0002	-.0016	.0048	.0004	.0014	.0011	-.0005
.600	5.58	-.04	.0030	-.2863	.0243	.0004	.0049	-.0004	-.0016	.0047	.0005	.0020	.0002	-.0009
.600	5.72	-.03	.0033	-.2947	.0250	.0006	.0049	-.0004	-.0015	.0047	.0004	.0020	.0002	-.0008
.600	1.04	.00	.0002	.0048	.0009	.0002	.0048	.0009	-.0018	.0049	.0008	.0020	-.0001	.0001
.600	1.04	5.99	.0078	.0063	-.0024	.0078	.0063	-.0024	.0020	.0052	-.0022	.0058	.0011	-.0003
.601	2.01	5.99	.0031	-.0594	.0268	.0005	.0063	.0122	-.0001	.0048	.0010	.0006	.0016	.0111
.600	2.97	5.95	.0224	-.1144	.0075	.0092	.0070	-.0034	.0019	.0051	-.0017	.0074	.0019	-.0016
.599	4.01	5.96	.0305	-.1808	.0120	.0093	.0076	-.0042	.0022	.0051	-.0021	.0071	.0025	-.0021
.600	5.63	5.96	.0429	-.2857	.0201	.0096	.0066	-.0049	.0022	.0050	-.0023	.0074	.0016	-.0026
1.199	5.60	-3.02	-.0199	-.0544	.0159	-.0167	.0186	.0097	-.0174	.0065	.0159	.0007	.0121	-.0062
1.199	5.61	-.03	-.0024	-.0554	.0083	-.0030	.0178	.0021	-.0038	.0054	.0035	.0008	.0124	-.0014
1.201	5.62	2.98	.0162	-.0544	-.0009	.0117	.0186	-.0072	.0105	.0061	-.0098	.0012	.0125	.0026
1.200	5.61	5.95	.0377	-.0513	-.0148	.0295	.0214	-.0210	.0255	.0083	-.0244	.0039	.0130	.0033
1.200	5.61	8.97	.0529	-.0438	-.0242	.0408	.0284	-.0304	.0353	.0123	-.0361	.0055	.0160	.0056
1.198	5.60	-.06	-.0036	-.0556	.0087	-.0043	.0176	.0025	-.0042	.0054	.0039	-.0001	.0122	-.0014
.901	1.11	-.05	-.0040	.0040	.0030	-.0040	.0040	.0030	-.0035	.0062	.0021	-.0005	-.0022	.0009
.900	1.99	-.03	-.0113	-.0243	.0194	-.0094	.0041	.0130	-.0049	.0057	.0043	-.0044	-.0016	.0086
.900	3.01	-.03	-.0038	-.0515	.0085	-.0042	.0041	.0037	-.0036	.0058	.0022	-.0006	-.0017	.0015
.900	3.98	.00	-.0028	-.0782	.0095	-.0035	.0049	.0024	-.0035	.0057	.0022	.0000	-.0008	.0002

Table 14. Continued

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
.902	5.59	-.03	-.0025	-.1242	.0135	-.0037	.0046	.0025	-.0035	.0057	.0022	-.0001	-.0010	.0004
.901	7.54	-.04	-.0024	-.1821	.0185	-.0042	.0033	.0028	-.0036	.0055	.0022	-.0006	-.0023	.0006
.901	1.11	-.04	-.0036	.0038	.0029	-.0036	.0038	.0029	-.0036	.0062	.0021	.0000	-.0024	.0008
.901	1.11	5.98	-.0021	.0030	.0063	-.0021	.0030	.0063	-.0053	.0055	.0056	.0033	-.0025	.0007
.901	2.00	5.97	-.0070	-.0261	.0231	-.0080	.0028	.0166	-.0067	.0049	.0078	-.0013	-.0021	.0089
.899	2.99	5.97	.0027	-.0512	.0125	-.0033	.0034	.0077	-.0052	.0051	.0056	.0019	-.0017	.0021
.903	4.05	5.98	.0073	-.0803	.0133	-.0022	.0040	.0060	-.0056	.0050	.0060	.0034	-.0010	.0000
.903	5.60	5.97	.0120	-.1242	.0168	-.0026	.0038	.0059	-.0056	.0050	.0059	.0030	-.0012	.0000
.899	7.59	5.95	.0182	-.1835	.0215	-.0031	.0026	.0056	-.0047	.0049	.0050	.0016	-.0023	.0006
.900	1.11	-3.02	-.0030	.0040	.0004	-.0030	.0040	.0004	-.0018	.0062	-.0001	-.0013	-.0021	.0005
.903	1.11	-.01	-.0032	.0039	.0029	-.0032	.0039	.0029	-.0037	.0062	.0023	.0005	-.0023	.0006
.899	1.11	2.98	-.0030	.0035	.0053	-.0030	.0035	.0053	-.0049	.0059	.0042	.0018	-.0024	.0011
.898	1.11	5.98	-.0024	.0030	.0063	-.0024	.0030	.0063	-.0049	.0055	.0051	.0025	-.0025	.0012
.898	1.11	8.98	.0037	.0039	.0038	.0038	.0039	.0038	-.0017	.0059	.0037	.0055	-.0020	.0001
.899	1.11	-3.05	-.0032	.0040	.0004	-.0032	.0040	.0004	-.0019	.0061	.0000	-.0014	-.0022	.0005
.902	5.63	-3.03	-.0089	-.1255	.0115	-.0032	.0046	.0005	-.0016	.0057	-.0002	-.0016	-.0011	.0007
.901	5.61	-.03	-.0022	-.1251	.0134	-.0034	.0046	.0024	-.0035	.0057	.0021	.0001	-.0011	.0002
.900	5.60	2.99	.0051	-.1251	.0154	-.0029	.0042	.0044	-.0048	.0054	.0042	.0019	-.0012	.0001
.901	5.60	5.97	.0120	-.1248	.0169	-.0026	.0039	.0059	-.0051	.0050	.0054	.0024	-.0012	.0005
.899	5.59	8.99	.0256	-.1232	.0135	.0042	.0047	.0025	-.0013	.0055	.0034	.0055	-.0008	-.0009
.800	1.08	-.03	-.0021	.0042	.0025	-.0021	.0042	.0025	-.0028	.0055	.0017	.0007	-.0013	.0008
.802	2.01	-.01	-.0115	-.0323	.0228	-.0091	.0043	.0146	-.0042	.0052	.0038	-.0049	-.0008	.0107
.802	3.00	-.02	-.0018	-.0651	.0087	-.0022	.0045	.0027	-.0028	.0052	.0017	.0005	-.0007	.0010
.803	4.00	-.03	-.0008	-.1002	.0104	-.0016	.0050	.0014	-.0027	.0052	.0016	.0011	-.0002	-.0002
.799	5.57	-.05	-.0002	-.1590	.0154	-.0016	.0047	.0015	-.0025	.0051	.0014	.0009	-.0004	.0001
.803	6.06	-.05	-.0002	-.1751	.0167	-.0018	.0044	.0015	-.0026	.0051	.0015	.0009	-.0007	.0000
.801	6.88	-.05	-.0001	-.2064	.0194	-.0020	.0038	.0016	-.0026	.0051	.0015	.0006	-.0013	.0001
.799	1.08	-.02	-.0019	.0041	.0023	-.0019	.0041	.0023	-.0027	.0054	.0016	.0008	-.0013	.0007
.801	1.08	-3.05	-.0043	.0044	.0020	-.0043	.0044	.0020	-.0041	.0057	.0024	-.0002	-.0012	-.0003
.800	1.08	-.02	-.0018	.0043	.0024	-.0018	.0043	.0024	-.0028	.0055	.0016	.0010	-.0012	.0008
.802	1.08	2.98	.0006	.0042	.0025	.0006	.0042	.0025	-.0014	.0054	.0010	.0020	-.0012	.0015
.801	1.07	5.97	.0026	.0044	.0019	.0027	.0044	.0019	-.0004	.0055	.0005	.0030	-.0011	.0013
.799	1.07	8.97	.0082	.0059	-.0017	.0082	.0059	-.0017	.0028	.0062	-.0022	.0055	-.0003	.0005
.800	5.66	-3.05	-.0119	-.1612	.0166	-.0047	.0048	.0025	-.0039	.0053	.0022	-.0008	-.0005	.0002
.800	5.63	-.02	-.0003	-.1607	.0155	-.0018	.0045	.0015	-.0024	.0052	.0013	.0006	-.0007	.0002
.799	5.61	2.99	.0110	-.1602	.0150	.0008	.0047	.0010	-.0012	.0051	.0008	.0020	-.0004	.0002
.798	5.61	5.96	.0216	-.1595	.0147	.0029	.0049	.0006	-.0001	.0052	.0003	.0029	-.0003	.0003
.799	5.61	8.95	.0356	-.1567	.0105	.0085	.0062	-.0035	.0030	.0059	-.0024	.0054	.0003	-.0011
.801	5.63	-.03	-.0005	-.1602	.0156	-.0020	.0046	.0016	-.0026	.0052	.0015	.0006	-.0006	.0001
.599	1.04	-3.05	-.0045	.0048	.0029	-.0045	.0048	.0029	-.0038	.0051	.0023	-.0006	-.0003	.0006
.599	1.04	-.03	-.0010	.0044	.0021	-.0010	.0044	.0021	-.0018	.0049	.0009	.0008	-.0006	.0012
.600	1.04	2.96	.0020	.0043	.0013	.0020	.0043	.0013	.0002	.0050	-.0006	.0019	-.0006	.0019
.601	1.04	5.98	.0056	.0052	-.0010	.0057	.0052	-.0010	.0020	.0053	-.0022	.0036	-.0001	.0012

Table 14. Concluded

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
.598	1.03	8.96	.0106	.0067	-.0048	.0107	.0067	-.0048	.0049	.0061	-.0051	.0058	.0006	.0003
.601	1.04	-3.05	-.0047	.0047	.0031	-.0048	.0047	.0031	-.0039	.0051	.0024	-.0009	-.0004	.0007
.600	5.64	-3.04	-.0175	-.2899	.0281	-.0047	.0046	.0031	-.0037	.0049	.0024	-.0009	-.0002	.0007
.601	5.57	-.02	.0021	-.2850	.0253	-.0006	.0044	.0008	-.0016	.0047	.0007	.0010	-.0003	.0000
.600	5.56	2.99	.0209	-.2850	.0236	.0030	.0045	-.0010	-.0001	.0047	-.0002	.0031	-.0002	-.0008
.600	5.57	5.95	.0397	-.2830	.0213	.0070	.0053	-.0034	.0022	.0051	-.0023	.0047	.0002	-.0011
.600	5.57	8.96	.0594	-.2797	.0173	.0115	.0068	-.0074	.0055	.0060	-.0056	.0060	.0008	-.0018
.601	1.04	-.03	-.0016	.0042	.0024	-.0016	.0042	.0024	-.0020	.0049	.0011	.0004	-.0008	.0013

Table 15. Aeropropulsive Characteristics for HI Nozzle With Two Tails and $\delta_v = 0°$

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
1.200	.92	-.05	-.0177	.0250	.0227	-.0177	.0250	.0227	-.0142	.0103	.0180	-.0035	.0147	.0047
1.199	1.95	-.02	-.0232	.0073	.0343	-.0222	.0228	.0308	-.0142	.0102	.0179	-.0080	.0126	.0130
1.202	3.96	-.05	-.0149	-.0235	.0210	-.0153	.0229	.0170	-.0140	.0102	.0180	-.0012	.0127	-.0010
1.197	5.61	-.06	-.0131	-.0506	.0203	-.0137	.0229	.0141	-.0137	.0103	.0175	.0000	.0126	-.0034
1.200	7.99	-.06	-.0128	-.0908	.0231	-.0139	.0209	.0136	-.0141	.0102	.0181	.0002	.0106	-.0045
1.201	10.02	-.05	-.0128	-.1253	.0264	-.0142	.0188	.0142	-.0141	.0102	.0181	-.0001	.0086	-.0038
1.199	10.98	-.03	-.0121	-.1421	.0271	-.0137	.0180	.0135	-.0135	.0102	.0173	-.0002	.0077	-.0038
1.200	.91	.00	-.0188	.0251	.0234	-.0188	.0251	.0234	-.0142	.0103	.0181	-.0045	.0148	.0053
1.201	.93	-3.06	-.0552	.0271	.0653	-.0552	.0271	.0653	-.0478	.0123	.0606	-.0074	.0148	.0047
1.200	.91	-.03	-.0192	.0253	.0238	-.0192	.0253	.0238	-.0143	.0103	.0181	-.0049	.0150	.0057
1.201	.88	2.98	.0149	.0263	-.0148	.0149	.0263	-.0148	.0189	.0116	-.0242	-.0040	.0147	.0094
1.197	.86	5.95	.0462	.0301	-.0492	.0462	.0301	-.0492	.0471	.0155	-.0600	-.0008	.0146	.0108
1.203	.84	8.95	.0596	.0380	-.0637	.0596	.0380	-.0637	.0541	.0199	-.0670	.0056	.0181	.0033
1.199	.93	-3.00	-.0547	.0271	.0647	-.0548	.0271	.0647	-.0470	.0123	.0596	-.0078	.0149	.0052
.602	1.04	-.01	.0038	.0074	-.0106	.0038	.0074	-.0106	.0068	.0077	-.0128	-.0030	-.0003	.0022
.602	2.00	-.02	-.0079	-.0567	.0206	-.0036	.0077	.0060	.0029	.0072	-.0070	-.0065	.0005	.0130
.601	3.01	-.06	.0075	-.1170	.0000	.0068	.0074	-.0108	.0059	.0074	-.0115	.0009	.0001	.0007
.601	3.98	-.07	.0091	-.1787	.0040	.0078	.0083	-.0120	.0058	.0073	-.0115	.0019	.0010	-.0005
.601	5.59	-.05	.0102	-.2837	.0128	.0077	.0071	-.0119	.0061	.0073	-.0116	.0017	-.0002	-.0003
.601	5.97	-.06	.0111	-.3084	.0144	.0083	.0067	-.0124	.0061	.0073	-.0117	.0022	-.0005	-.0007
.601	1.04	-.01	.0081	.0069	-.0114	.0081	.0069	-.0114	.0063	.0075	-.0120	.0019	-.0007	.0006
.600	1.04	-3.05	-.0071	.0075	.0078	-.0071	.0075	.0078	-.0072	.0078	.0063	.0002	-.0004	.0015
.600	1.04	-.05	.0091	.0074	-.0115	.0091	.0074	-.0115	.0060	.0075	-.0117	.0031	-.0001	.0002
.600	1.04	2.99	.0258	.0087	-.0315	.0258	.0087	-.0315	.0206	.0084	-.0314	.0052	.0002	-.0001
.599	1.04	5.94	.0402	.0116	-.0499	.0402	.0116	-.0499	.0336	.0107	-.0494	.0066	.0009	-.0006
.597	1.04	8.95	.0504	.0155	-.0626	.0505	.0155	-.0626	.0419	.0138	-.0611	.0086	.0017	-.0016
.599	1.04	-3.05	-.0068	.0073	.0078	-.0069	.0073	.0078	-.0072	.0078	.0063	.0004	-.0005	.0015
.601	5.64	-3.06	-.0209	-.2856	.0344	-.0080	.0077	.0095	-.0082	.0075	.0077	.0002	.0001	.0018
.600	5.59	-.05	.0118	-.2837	.0123	.0093	.0072	-.0124	.0062	.0072	-.0116	.0031	-.0001	-.0008
.600	5.64	2.98	.0438	-.2854	-.0080	.0257	.0087	-.0331	.0204	.0082	-.0308	.0052	.0006	-.0023
.600	5.60	5.93	.0733	-.2788	-.0269	.0404	.0116	-.0517	.0335	.0105	-.0488	.0068	.0011	-.0029
.600	5.60	3.94	.0991	-.2725	-.0401	.0510	.0156	-.0649	.0421	.0137	-.0609	.0089	.0019	-.0040
.601	1.04	-.06	.0083	.0069	-.0111	.0083	.0069	-.0111	.0058	.0075	-.0114	.0025	-.0005	.0003
1.201	5.65	-3.05	-.0516	-.0488	.0626	-.0484	.0247	.0563	-.0472	.0122	.0601	-.0012	.0125	-.0038
1.200	5.58	.00	-.0109	-.0496	.0197	-.0116	.0232	.0135	-.0134	.0102	.0172	.0018	.0129	-.0037
1.200	5.59	2.98	.0275	-.0483	-.0208	.0230	.0246	-.0270	.0196	.0116	-.0249	.0034	.0130	-.0021
1.200	5.60	5.93	.0620	-.0443	-.0550	.0538	.0282	-.0612	.0470	.0153	-.0596	.0068	.0129	-.0016
1.200	5.61	3.95	.0733	-.0363	-.0587	.0614	.0357	-.0649	.0534	.0197	-.0662	.0080	.0160	.0013
1.198	.91	-.05	-.0184	.0255	.0238	-.0184	.0255	.0238	-.0145	.0103	.0184	-.0038	.0152	.0053
.902	1.10	-.06	-.0036	.0083	-.0009	-.0036	.0083	-.0009	.0006	.0105	-.0075	-.0041	-.0022	.0066
.900	2.04	-.01	-.0071	-.0218	.0098	-.0052	.0081	.0033	.0006	.0095	-.0074	-.0058	-.0014	.0107
.902	2.98	-.03	-.0001	-.0464	-.0002	-.0004	.0081	-.0050	.0018	.0098	-.0094	-.0021	-.0017	.0045
.899	4.04	-.04	.0036	-.0763	-.0029	.0029	.0089	-.0102	.0029	.0097	-.0112	.0000	-.0008	.0011

Table 15. Concluded

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
.898	5.60	-.07	.0044	-.1215	.0001	.0033	.0088	-.0110	.0031	.0096	-.0115	.0003	-.0009	.0005
.901	7.74	-.06	.0045	-.1835	.0053	.0028	.0072	-.0109	.0024	.0095	-.0106	.0004	-.0023	-.0003
.900	1.10	-.03	-.0018	.0080	-.0020	-.0018	.0080	-.0020	.0009	.0105	-.0081	-.0027	-.0025	.0061
.900	1.10	-3.06	-.0119	.0080	.0119	-.0120	.0080	.0119	-.0091	.0105	.0069	-.0029	-.0025	.0050
.903	1.10	-.02	-.0017	.0082	-.0012	-.0017	.0082	-.0012	.0004	.0105	-.0071	-.0020	-.0023	.0059
.902	1.09	2.99	.0089	.0085	-.0145	.0089	.0085	-.0145	.0086	.0106	-.0198	.0002	-.0021	.0053
.901	1.09	5.99	.0162	.0093	-.0247	.0162	.0093	-.0247	.0165	.0113	-.0312	-.0003	-.0019	.0065
.900	1.10	8.95	.0301	.0121	-.0383	.0302	.0121	-.0383	.0236	.0135	-.0406	.0066	-.0014	.0023
.897	1.10	-3.07	-.0109	.0078	.0103	-.0109	.0078	.0103	-.0082	.0104	.0054	-.0027	-.0026	.0049
.899	5.61	-3.04	-.0144	-.1219	.0176	-.0088	.0083	.0065	-.0075	.0096	.0044	-.0013	-.0013	.0021
.903	5.66	-.06	.0037	-.1221	.0014	.0026	.0085	-.0097	.0020	.0098	-.0097	.0006	-.0013	.0001
.902	5.65	2.99	.0215	-.1211	-.0126	.0134	.0092	-.0237	.0102	.0101	-.0223	.0032	-.0009	-.0014
.900	5.63	5.97	.0363	-.1193	-.0244	.0215	.0105	-.0355	.0185	.0110	-.0342	.0031	-.0005	-.0013
.898	5.61	8.94	.0553	-.1157	-.0342	.0338	.0133	-.0453	.0249	.0131	-.0422	.0089	.0002	-.0032
.800	1.08	-.06	.0036	.0070	-.0141	.0086	.0070	-.0141	.0079	.0083	-.0162	.0007	-.0014	.0021
.801	2.03	-.04	-.0021	-.0301	.0085	.0003	.0072	.0003	.0048	.0078	-.0113	-.0046	-.0006	.0116
.800	3.04	-.06	.0089	-.0642	-.0074	.0085	.0071	-.0135	.0075	.0079	-.0154	.0010	-.0008	.0019
.800	4.02	-.06	.0100	-.0990	-.0059	.0092	.0078	-.0151	.0078	.0079	-.0158	.0014	-.0001	.0007
.800	5.62	-.06	.0101	-.1576	-.0006	.0087	.0072	-.0146	.0075	.0079	-.0153	.0012	-.0007	.0007
.801	5.96	-.06	.0101	-.1695	.0003	.0086	.0071	-.0147	.0076	.0079	-.0155	.0010	-.0007	.0008
.801	7.00	-.05	.0108	-.2081	.0033	.0088	.0064	-.0149	.0076	.0078	-.0155	.0012	-.0014	.0006
.801	1.08	-.02	.0094	.0067	-.0150	.0094	.0067	-.0150	.0086	.0083	-.0172	.0008	-.0017	.0021
.800	1.08	-3.06	-.0069	.0070	.0049	-.0069	.0070	.0049	-.0055	.0085	.0023	-.0014	-.0015	.0025
.799	1.08	-.06	.0094	.0069	-.0147	.0094	.0069	-.0147	.0084	.0083	-.0169	.0010	-.0014	.0021
.801	1.08	2.97	.0239	.0080	-.0328	.0239	.0080	-.0328	.0219	.0094	-.0355	.0020	-.0014	.0028
.799	1.07	5.92	.0371	.0105	-.0499	.0371	.0105	-.0499	.0342	.0116	-.0529	.0030	-.0011	.0031
.800	1.08	8.96	.0467	.0140	-.0606	.0468	.0140	-.0606	.0405	.0145	-.0619	.0062	-.0005	.0012
.801	1.08	-.06	.0085	.0067	-.0143	.0085	.0067	-.0143	.0081	.0083	-.0165	.0003	-.0017	.0022

Table 16. Aeropropulsive Characteristics for HI Nozzle With Three Tails and $\delta_v = 0°$

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
1.202	.92	-.02	-.0074	.0265	.0037	-.0074	.0265	.0037	-.0061	.0114	.0050	-.0012	.0151	-.0012
1.202	1.97	.03	-.0127	.0086	.0151	-.0116	.0242	.0115	-.0060	.0115	.0046	-.0057	.0128	.0069
1.201	3.99	-.02	-.0067	-.0221	.0061	-.0071	.0248	.0021	-.0062	.0115	.0051	-.0009	.0133	-.0030
1.200	5.64	-.02	-.0056	-.0493	.0069	-.0062	.0244	.0007	-.0060	.0115	.0049	-.0002	.0129	-.0043
1.200	8.02	-.01	-.0049	-.0897	.0099	-.0061	.0224	.0004	-.0059	.0115	.0048	-.0002	.0110	-.0044
1.201	10.07	-.03	-.0052	-.1244	.0135	-.0067	.0205	.0013	-.0064	.0114	.0056	-.0002	.0091	-.0043
1.201	11.02	-.03	-.0053	-.1404	.0152	-.0069	.0196	.0017	-.0065	.0114	.0057	-.0004	.0082	-.0040
1.200	.92	.00	-.0074	.0269	.0032	-.0074	.0269	.0032	-.0059	.0115	.0046	-.0015	.0154	-.0014
1.201	.94	-3.02	-.0511	.0285	.0599	-.0511	.0285	.0599	-.0456	.0137	.0604	-.0055	.0148	-.0005
1.200	.91	-.01	-.0063	.0271	.0023	-.0063	.0271	.0023	-.0051	.0115	.0034	-.0012	.0155	-.0011
1.203	.91	2.99	.0393	.0293	-.0573	.0393	.0293	-.0573	.0354	.0135	-.0536	.0040	.0158	-.0037
1.200	.86	5.97	.0687	.0359	-.0908	.0687	.0359	-.0908	.0615	.0190	-.0896	.0073	.0169	-.0013
1.201	.84	7.98	.0930	.0430	-.1262	.0931	.0430	-.1262	.0821	.0244	-.1217	.0110	.0186	-.0044
1.202	.94	-2.99	-.0497	.0285	.0585	-.0497	.0285	.0585	-.0452	.0136	.0600	-.0045	.0149	-.0015
1.202	5.64	-2.96	-.0533	-.0469	.0673	-.0502	.0264	.0610	-.0449	.0135	.0596	-.0053	.0129	.0014
.599	1.04	-.02	.0065	.0073	-.0125	.0065	.0073	-.0125	.0060	.0080	-.0134	.0005	-.0006	.0009
.602	2.05	.02	-.0087	-.0596	.0236	-.0046	.0079	.0092	.0012	.0075	-.0058	-.0058	.0004	.0150
.602	3.00	-.03	.0091	-.1154	-.0026	.0084	.0079	-.0132	.0057	.0076	-.0129	.0028	.0003	-.0003
.601	3.99	-.03	.0106	-.1790	.0017	.0092	.0087	-.0144	.0057	.0076	-.0129	.0035	.0011	-.0015
.601	5.60	-.03	.0115	-.2829	.0102	.0089	.0076	-.0144	.0059	.0076	-.0131	.0031	.0000	-.0013
.603	6.05	-.02	.0124	-.3112	.0124	.0095	.0071	-.0146	.0061	.0076	-.0134	.0034	-.0005	-.0012
.601	1.04	.02	.0088	.0076	-.0133	.0088	.0076	-.0133	.0062	.0079	-.0137	.0026	-.0003	.0004
.601	1.04	-3.02	-.0103	.0081	.0137	-.0103	.0081	.0137	-.0109	.0083	.0120	.0006	-.0002	.0017
.603	1.04	-.01	.0097	.0081	-.0133	.0097	.0081	-.0133	.0059	.0079	-.0134	.0038	.0003	.0000
.602	1.04	3.02	.0310	.0099	-.0429	.0311	.0099	-.0429	.0248	.0091	-.0417	.0062	.0008	-.0012
.601	1.04	5.97	.0572	.0142	-.0812	.0572	.0143	-.0812	.0485	.0127	-.0781	.0087	.0016	-.0031
.597	1.04	8.97	.0865	.0220	-.1257	.0866	.0220	-.1257	.0753	.0193	-.1204	.0113	.0027	-.0053
.602	1.04	-3.03	-.0112	.0077	.0145	-.0112	.0077	.0145	-.0112	.0083	.0124	.0000	-.0005	.0020
.603	5.62	-3.02	-.0228	-.2820	.0389	-.0103	.0077	.0142	-.0113	.0080	.0129	.0011	-.0002	.0013
.598	5.59	-.03	.0125	-.2857	.0099	.0099	.0077	-.0150	.0064	.0076	-.0136	.0034	.0001	-.0014
.598	5.61	3.02	.0500	-.2851	-.0205	.0317	.0095	-.0456	.0255	.0089	-.0423	.0062	.0006	-.0032
.601	5.62	5.96	.0914	-.2767	-.0599	.0583	.0141	-.0847	.0493	.0125	-.0792	.0090	.0015	-.0055
.597	5.62	8.95	.1380	-.2700	-.1052	.0892	.0220	-.1304	.0763	.0192	-.1218	.0129	.0028	-.0086
.602	1.04	-.02	.0089	.0073	-.0129	.0089	.0073	-.0129	.0057	.0078	-.0130	.0032	-.0004	.0002
1.200	5.63	-.01	-.0027	-.0464	.0062	-.0034	.0251	.0000	-.0060	.0114	.0051	.0026	.0137	-.0051
1.200	5.63	3.01	.0484	-.0458	-.0563	.0439	.0275	-.0626	.0342	.0134	-.0515	.0097	.0141	-.0110
1.200	5.63	5.95	.0849	-.0388	-.0963	.0767	.0342	-.1025	.0614	.0189	-.0892	.0153	.0153	-.0133
1.201	5.63	8.96	.1286	-.0246	-.1566	.1165	.0478	-.1628	.0943	.0277	-.1403	.0222	.0201	-.0225
1.201	.91	.00	-.0064	.0271	.0040	-.0064	.0271	.0040	-.0064	.0115	.0053	.0000	.0157	-.0013
.899	1.10	.01	.0011	.0083	-.0081	.0011	.0083	-.0081	.0028	.0105	-.0113	-.0017	-.0023	.0032
.901	2.02	.00	-.0070	-.0212	.0099	-.0051	.0083	.0034	.0001	.0095	-.0064	-.0052	-.0012	.0098
.901	3.04	-.02	.0022	-.0477	-.0036	.0018	.0086	-.0084	.0027	.0098	-.0110	-.0008	-.0013	.0026
.902	4.01	-.01	.0046	-.0747	-.0045	.0039	.0093	-.0117	.0030	.0098	-.0116	.0009	-.0005	-.0001

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Table 16. Concluded

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
.903	5.69	-.02	.0053	-.1224	-.0010	.0041	.0091	-.0121	.0028	.0098	-.0112	.0013	-.0006	-.0009
.901	8.03	-.02	.0071	-.1918	.0038	.0051	.0073	-.0131	.0031	.0094	-.0117	.0020	-.0021	-.0014
.899	1.10	-3.03	-.0059	.0085	.0050	-.0059	.0085	.0050	-.0048	.0106	.0022	-.0011	-.0022	.0027
.900	1.10	-.01	.0036	.0087	-.0089	.0036	.0087	-.0089	.0027	.0105	-.0112	.0009	-.0018	.0023
.899	1.10	3.01	.0160	.0092	-.0272	.0160	.0092	-.0272	.0143	.0108	-.0306	.0017	-.0016	.0034
.903	1.10	5.98	.0345	.0118	-.0553	.0345	.0118	-.0553	.0315	.0130	-.0592	.0030	-.0012	.0039
.900	1.11	8.97	.0783	.0197	-.1133	.0784	.0197	-.1133	.0652	.0194	-.1110	.0132	.0003	-.0023
.899	1.10	-3.02	-.0064	.0082	.0052	-.0064	.0082	.0052	-.0047	.0106	.0021	-.0017	-.0025	.0031
.899	5.63	-3.02	-.0102	-.1218	.0129	-.0045	.0089	.0018	-.0041	.0097	.0010	-.0005	-.0008	.0008
.899	5.58	-.02	.0068	-.1201	-.0022	.0056	.0094	-.0132	.0035	.0097	-.0123	.0022	-.0003	-.0009
.900	5.59	3.03	.0279	-.1191	-.0236	.0198	.0101	-.0346	.0153	.0102	-.0322	.0045	-.0002	-.0024
.900	5.59	6.00	.0548	-.1157	-.0561	.0401	.0129	-.0671	.0354	.0128	-.0649	.0047	.0001	-.0021
.900	5.59	8.97	.1047	-.1061	-.1115	.0834	.0214	-.1225	.0664	.0191	-.1129	.0169	.0023	-.0096
.799	1.08	-.01	.0069	.0072	-.0127	.0069	.0072	-.0127	.0060	.0086	-.0149	.0008	-.0014	.0022
.800	2.00	.03	-.0042	-.0291	.0108	-.0018	.0076	.0026	.0021	.0080	-.0084	-.0040	-.0003	.0109
.798	3.04	-.02	.0074	-.0640	-.0061	.0070	.0076	-.0122	.0056	.0082	-.0140	.0014	-.0006	.0017
.801	3.94	-.02	.0084	-.0954	-.0049	.0076	.0083	-.0137	.0057	.0081	-.0142	.0018	.0002	.0005
.801	5.66	-.02	.0092	-.1582	.0001	.0077	.0077	-.0140	.0057	.0081	-.0142	.0020	-.0004	.0002
.801	6.00	-.02	.0090	-.1710	.0014	.0074	.0074	-.0138	.0057	.0081	-.0141	.0017	-.0006	.0003
.802	7.03	-.03	.0096	-.2085	.0044	.0076	.0068	-.0138	.0056	.0080	-.0140	.0020	-.0011	.0002
.801	1.08	.01	.0070	.0072	-.0128	.0070	.0072	-.0128	.0062	.0086	-.0151	.0008	-.0014	.0023
.801	1.08	-3.02	-.0093	.0076	.0098	-.0093	.0076	.0098	-.0083	.0089	.0071	-.0010	-.0014	.0027
.800	1.08	-.03	.0078	.0075	-.0134	.0078	.0075	-.0134	.0064	.0086	-.0154	.0014	-.0012	.0020
.802	1.08	3.02	.0257	.0088	-.0381	.0257	.0088	-.0381	.0226	.0098	-.0400	.0032	-.0010	.0019
.798	1.08	5.97	.0508	.0125	-.0756	.0508	.0125	-.0756	.0458	.0132	-.0765	.0050	-.0007	.0009
.798	1.08	8.97	.0801	.0197	-.1171	.0802	.0197	-.1171	.0704	.0193	-.1152	.0098	.0004	-.0019

Table 17. Aeropropulsive Characteristics for HI Nozzle With Four Tails and $\delta_v = 0°$

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
1.201	.91	.00	-.0119	.0291	.0116	-.0119	.0291	.0116	-.0100	.0138	.0102	-.0018	.0153	.0014
1.200	2.01	.02	-.0174	.0111	.0229	-.0163	.0274	.0192	-.0098	.0138	.0097	-.0065	.0136	.0095
1.199	3.96	-.01	-.0097	-.0191	.0106	-.0101	.0275	.0066	-.0097	.0138	.0098	-.0004	.0137	-.0033
1.199	5.60	-.01	-.0082	-.0460	.0100	-.0088	.0272	.0038	-.0099	.0138	.0102	.0010	.0133	-.0064
1.200	7.98	-.02	-.0069	-.0863	.0121	-.0080	.0251	.0027	-.0093	.0138	.0095	.0013	.0113	-.0068
1.199	9.99	.01	-.0070	-.1207	.0156	-.0086	.0233	.0034	-.0094	.0138	.0096	.0008	.0095	-.0062
1.202	10.86	-.01	-.0074	-.1351	.0176	-.0091	.0224	.0044	-.0097	.0137	.0101	.0006	.0087	-.0057
1.197	.91	.01	-.0126	.0294	.0118	-.0126	.0294	.0118	-.0097	.0139	.0096	-.0029	.0155	.0022
1.198	.93	-2.99	-.0643	.0315	.0798	-.0643	.0315	.0798	-.0579	.0159	.0772	-.0064	.0157	.0026
1.202	.90	.00	-.0101	.0297	.0092	-.0101	.0297	.0092	-.0079	.0138	.0072	-.0022	.0158	.0021
1.202	.87	3.02	.0421	.0325	-.0594	.0422	.0325	-.0594	.0411	.0167	-.0618	.0011	.0158	.0024
1.201	.84	5.98	.0769	.0391	-.1020	.0769	.0391	-.1020	.0717	.0223	-.1057	.0052	.0168	.0037
1.204	.83	5.98	.0898	.0426	-.1209	.0898	.0426	-.1209	.0830	.0251	-.1228	.0068	.0174	.0019
1.200	.93	-2.98	-.0641	.0315	.0799	-.0641	.0315	.0799	-.0580	.0158	.0775	-.0061	.0157	.0025
.600	1.04	.01	.0155	.0094	-.0254	.0155	.0094	-.0254	.0150	.0093	-.0258	.0005	.0001	.0004
.600	2.02	.01	-.0007	-.0560	.0109	.0035	.0102	-.0037	.0087	.0088	-.0162	-.0052	.0014	.0126
.600	2.98	-.01	.0179	-.1132	-.0155	.0173	.0101	-.0264	.0147	.0090	-.0254	.0026	.0012	-.0010
.600	3.97	-.02	.0193	-.1761	-.0111	.0178	.0108	-.0271	.0144	.0089	-.0250	.0034	.0018	-.0021
.601	5.63	-.02	.0204	-.2830	-.0019	.0177	.0096	-.0268	.0144	.0089	-.0249	.0032	.0007	-.0019
.599	1.04	-.01	.0184	.0097	-.0265	.0184	.0097	-.0265	.0151	.0092	-.0260	.0034	.0006	-.0005
1.203	5.60	-2.99	-.0640	-.0428	.0829	-.0609	.0297	.0767	-.0582	.0157	.0779	-.0027	.0141	-.0012
1.198	5.67	-.02	-.0029	-.0462	.0060	-.0036	.0282	-.0003	-.0079	.0138	.0076	.0043	.0143	-.0079
1.198	5.64	2.98	.0564	-.0425	-.0682	.0519	.0313	-.0744	.0410	.0167	-.0610	.0109	.0146	-.0134
1.201	5.61	4.48	.0842	-.0387	-.1015	.0778	.0340	-.1077	.0632	.0195	-.0924	.0147	.0145	-.0153
1.199	.90	.02	-.0101	.0300	.0108	-.0101	.0300	.0108	-.0094	.0138	.0094	-.0007	.0162	.0015
.901	1.08	.00	.0049	.0124	-.0128	.0049	.0124	-.0128	.0065	.0129	-.0171	-.0016	-.0005	.0043
.902	2.03	.01	.0010	-.0174	-.0023	.0029	.0121	-.0088	.0054	.0119	-.0150	-.0025	.0002	.0063
.901	3.04	-.02	.0092	-.0441	-.0140	.0088	.0120	-.0188	.0081	.0123	-.0197	.0007	-.0002	.0009
.900	4.00	-.01	.0122	-.0710	-.0163	.0115	.0128	-.0235	.0086	.0123	-.0206	.0029	.0005	-.0029
.901	5.62	-.01	.0132	-.1176	-.0137	.0120	.0125	-.0248	.0086	.0122	-.0208	.0033	.0003	-.0040
.903	7.57	-.02	.0139	-.1738	-.0096	.0121	.0114	-.0253	.0083	.0121	-.0202	.0038	-.0007	-.0051
.899	1.09	-.03	.0060	.0120	-.0135	.0060	.0120	-.0135	.0068	.0128	-.0176	-.0009	-.0008	.0041
.901	1.10	-3.01	-.0087	.0114	.0078	-.0087	.0114	.0078	-.0067	.0130	.0038	-.0020	-.0016	.0040
.901	1.09	-.01	.0065	.0124	-.0134	.0065	.0124	-.0134	.0067	.0129	-.0173	-.0002	-.0006	.0039
.899	1.08	2.99	.0237	.0134	-.0396	.0238	.0134	-.0396	.0229	.0136	-.0433	.0008	-.0001	.0037
.900	1.07	6.01	.0428	.0162	-.0696	.0428	.0162	-.0696	.0426	.0158	-.0749	.0002	.0004	.0053
.899	1.08	7.59	.0623	.0195	-.0969	.0624	.0195	-.0969	.0587	.0187	-.1003	.0037	.0008	.0034
.899	1.10	-3.02	-.0087	.0111	.0072	-.0087	.0111	.0072	-.0063	.0129	.0031	-.0024	-.0018	.0041
.899	5.63	-3.02	-.0102	-.1196	.0112	-.0046	.0114	.0001	-.0051	.0119	.0008	.0005	-.0005	-.0007
.900	5.60	.00	.0137	-.1172	-.0143	.0125	.0126	-.0253	.0090	.0122	-.0214	.0035	.0004	-.0039
.901	5.59	3.00	.0392	-.1150	-.0431	.0312	.0140	-.0541	.0259	.0133	-.0485	.0053	.0008	-.0056
.897	5.57	5.97	.0692	-.1114	-.0795	.0545	.0174	-.0905	.0484	.0161	-.0843	.0062	.0013	-.0062
.899	5.58	7.27	.0866	-.1080	-.1001	.0690	.0204	-.1111	.0598	.0184	-.1025	.0092	.0020	-.0086

ORIGINAL PAGE IS
OF POOR QUALITY

Table 17. Concluded

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
.900	1.07	5.97	.0414	.0162	-.0673	.0415	.0162	-.0673	.0408	.0156	-.0724	.0007	.0005	.0051
.902	1.99	6.00	.0417	-.0127	-.0590	.0406	.0158	-.0654	.0397	.0147	-.0702	.0009	.0011	.0048
.904	3.03	6.00	.0515	-.0389	-.0690	.0454	.0163	-.0738	.0416	.0155	-.0742	.0038	.0009	.0004
.899	3.99	5.96	.0606	-.0657	-.0775	.0512	.0176	-.0846	.0458	.0159	-.0804	.0054	.0017	-.0043
.899	5.60	5.98	.0679	-.1119	-.0776	.0532	.0173	-.0886	.0469	.0160	-.0823	.0063	.0012	-.0064
.901	7.48	5.97	.0747	-.1655	-.0749	.0538	.0165	-.0904	.0463	.0159	-.0817	.0075	.0006	-.0087
.800	1.08	-.02	.0189	.0091	-.0300	.0189	.0091	-.0300	.0174	.0101	-.0316	.0014	-.0010	.0016
.799	2.04	.01	.0061	-.0286	-.0040	.0085	.0094	-.0122	.0124	.0094	-.0234	-.0039	.0000	.0112
.800	2.99	.00	.0185	-.0601	-.0225	.0181	.0094	-.0286	.0166	.0097	-.0301	.0016	-.0002	.0016
.799	3.98	-.02	.0199	-.0954	-.0215	.0191	.0101	-.0305	.0167	.0096	-.0303	.0024	.0005	-.0002
.601	5.62	-.01	.0203	-.1549	-.0163	.0187	.0096	-.0303	.0166	.0096	-.0302	.0021	.0000	-.0001
.802	6.00	-.01	.0205	-.1687	-.0153	.0188	.0094	-.0304	.0167	.0096	-.0302	.0021	-.0002	-.0002
.802	6.80	-.01	.0209	-.1983	-.0127	.0189	.0086	-.0303	.0165	.0095	-.0300	.0023	-.0009	-.0002
.802	1.08	.00	.0189	.0088	-.0302	.0189	.0088	-.0302	.0175	.0101	-.0318	.0013	-.0013	.0015
.802	1.08	-3.02	-.0066	.0089	.0047	-.0066	.0089	.0047	-.0055	.0101	.0023	-.0011	-.0012	.0023
.799	1.08	-.02	.0191	.0091	-.0303	.0191	.0091	-.0303	.0176	.0101	-.0318	.0015	-.0010	.0015
.801	1.07	3.00	.0438	.0114	-.0645	.0439	.0114	-.0645	.0409	.0122	-.0665	.0029	-.0008	.0020
.800	1.07	5.98	.0735	.0164	-.1084	.0736	.0164	-.1084	.0691	.0170	-.1105	.0045	-.0006	.0021
.801	1.08	8.97	.1049	.0249	-.1549	.1050	.0249	-.1549	.0957	.0247	-.1535	.0093	.0002	-.0014
.601	1.08	-.02	.0171	.0088	-.0288	.0171	.0088	-.0288	.0170	.0101	-.0310	.0001	-.0013	.0022
.602	1.04	-3.01	-.0123	.0092	.0133	-.0123	.0092	.0133	-.0103	.0095	.0108	-.0020	-.0003	.0025
.502	1.04	-.01	.0159	.0091	-.0253	.0159	.0091	-.0253	.0146	.0092	-.0255	.0013	-.0001	.0002
.602	1.04	3.00	.0439	.0115	-.0639	.0439	.0115	-.0639	.0404	.0112	-.0633	.0035	.0003	-.0006
.601	1.04	5.97	.0757	.0171	-.1100	.0758	.0171	-.1100	.0696	.0161	-.1077	.0062	.0010	-.0023
.599	1.04	8.96	.1082	.0260	-.1587	.1083	.0260	-.1587	.0989	.0241	-.1542	.0094	.0019	-.0045
.600	1.04	-3.01	-.0116	.0090	.0131	-.0116	.0090	.0131	-.0102	.0094	.0107	-.0014	-.0004	.0024
.600	5.57	-3.02	-.0248	-.2801	.0387	-.0123	.0096	.0141	-.0107	.0091	.0118	-.0016	.0005	.0023
.602	5.57	-.01	.0197	-.2789	-.0015	.0170	.0093	-.0259	.0141	.0089	-.0243	.0030	.0004	-.0016
.601	5.56	2.99	.0637	-.2763	-.0421	.0459	.0121	-.0667	.0404	.0109	-.0630	.0055	.0012	-.0036
.603	5.57	5.96	.1117	-.2675	-.0903	.0792	.0179	-.1147	.0704	.0158	-.1088	.0087	.0021	-.0060
.599	5.58	8.98	.1598	-.2605	-.1395	.1117	.0268	-.1643	.0997	.0239	-.1554	.0119	.0029	-.0089
.600	1.04	-.03	.0167	.0088	-.0244	.0167	.0088	-.0244	.0136	.0090	-.0241	.0031	-.0002	-.0003

ORIGINAL PAGE IS OF POOR QUALITY

Table 18. Aeropropulsive Characteristics for MED Nozzle With Tails Off and $\delta_v = 20°$

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
1.204	.86	.03	.0062	.0185	-.0172	.0062	.0185	-.0172	-.0035	.0053	.0033	.0097	.0133	-.0205
1.198	1.94	.04	.0112	.0023	-.0255	.0058	.0161	-.0167	-.0028	.0054	.0025	.0085	.0107	-.0192
1.201	4.01	.06	.0251	-.0248	-.0479	.0111	.0179	-.0264	-.0013	.0054	.0010	.0124	.0125	-.0274
1.202	5.58	.06	.0359	-.0470	-.0644	.0151	.0183	-.0335	-.0005	.0054	.0003	.0156	.0129	-.0338
1.202	7.95	.04	.0492	-.0814	-.0836	.0183	.0178	-.0385	.0003	.0054	-.0005	.0180	.0124	-.0380
1.202	9.02	.02	.0539	-.0974	-.0903	.0184	.0172	-.0388	.0007	.0054	-.0010	.0177	.0117	-.0378
1.201	.86	.07	.0061	.0191	-.0178	.0061	.0191	-.0178	-.0028	.0054	.0025	.0089	.0138	-.0203
1.199	.87	-2.95	-.0105	.0192	-.0058	-.0105	.0192	-.0058	-.0168	.0064	.0153	.0063	.0128	-.0211
1.202	.85	.03	.0056	.0193	-.0175	.0056	.0193	-.0175	-.0029	.0054	.0024	.0084	.0139	-.0199
1.200	.82	3.06	.0233	.0224	-.0327	.0233	.0224	-.0327	.0114	.0062	-.0108	.0119	.0162	-.0219
1.199	.80	6.05	.0431	.0280	-.0513	.0431	.0280	-.0513	.0260	.0085	-.0249	.0171	.0194	-.0264
1.200	.75	9.05	.0578	.0378	-.0676	.0579	.0378	-.0676	.0362	.0126	-.0372	.0217	.0251	-.0303
1.203	.87	-2.97	-.0107	.0193	-.0056	-.0108	.0193	-.0056	-.0169	.0065	.0154	.0061	.0129	-.0210
1.202	.85	.04	.0060	.0194	-.0177	.0060	.0194	-.0177	-.0027	.0055	.0023	.0087	.0139	-.0199
.900	1.02	.05	.0139	.0084	-.0315	.0139	.0084	-.0315	.0010	.0059	-.0049	.0129	.0024	-.0267
.899	1.96	.05	.0331	-.0162	-.0622	.0232	.0088	-.0463	.0032	.0056	-.0081	.0200	.0032	-.0382
.900	2.99	.04	.0377	-.0421	-.0678	.0208	.0081	-.0414	.0030	.0056	-.0077	.0178	.0025	-.0337
.900	4.06	.03	.0510	-.0677	-.0893	.0257	.0096	-.0505	.0038	.0056	-.0088	.0219	.0040	-.0417
.899	5.57	.04	.0655	-.1067	-.1102	.0285	.0098	-.0550	.0044	.0055	-.0096	.0241	.0043	-.0454
.900	1.03	.02	.0161	.0086	-.0326	.0161	.0086	-.0326	.0011	.0059	-.0050	.0151	.0027	-.0276
.897	1.02	-2.97	.0149	.0073	-.0310	.0149	.0073	-.0310	.0023	.0056	-.0065	.0126	.0018	-.0245
.901	1.02	.03	.0169	.0086	-.0328	.0169	.0086	-.0328	.0010	.0059	-.0050	.0159	.0027	-.0278
.900	1.03	3.09	.0197	.0103	-.0370	.0197	.0103	-.0370	.0005	.0059	-.0041	.0192	.0044	-.0328
.898	1.03	6.06	.0204	.0115	-.0374	.0204	.0115	-.0374	.0008	.0058	-.0037	.0196	.0057	-.0337
.899	1.03	9.04	.0307	.0153	-.0465	.0308	.0153	-.0465	.0042	.0066	-.0054	.0266	.0087	-.0411
.901	1.02	-2.95	.0137	.0074	-.0304	.0137	.0074	-.0304	.0026	.0056	-.0067	.0111	.0018	-.0236
.800	1.02	.04	.0207	.0097	-.0391	.0207	.0097	-.0391	.0026	.0053	-.0065	.0181	.0044	-.0326
.801	1.98	.08	.0441	-.0214	-.0770	.0313	.0107	-.0566	.0053	.0050	-.0104	.0260	.0056	-.0462
.801	3.04	.04	.0498	-.0550	-.0842	.0280	.0099	-.0502	.0048	.0051	-.0096	.0231	.0048	-.0407
.740	3.97	.01	.0738	-.0983	-.1228	.0373	.0130	-.0668	.0063	.0059	-.0122	.0310	.0070	-.0546
.805	5.62	.02	.0801	-.1361	-.1298	.0336	.0107	-.0603	.0061	.0050	-.0114	.0274	.0057	-.0490
.785	5.51	.03	.0818	-.1393	-.1323	.0339	.0114	-.0608	.0064	.0049	-.0116	.0275	.0065	-.0492
.801	1.02	.07	.0220	.0097	-.0401	.0220	.0097	-.0401	.0026	.0052	-.0064	.0194	.0045	-.0337
.801	1.01	-2.96	.0156	.0083	-.0322	.0156	.0083	-.0322	.0005	.0051	-.0046	.0151	.0032	-.0276
.803	1.02	.04	.0226	.0101	-.0401	.0226	.0101	-.0401	.0026	.0053	-.0065	.0200	.0048	-.0336
.800	1.01	3.08	.0287	.0125	-.0477	.0288	.0125	-.0477	.0048	.0056	-.0086	.0239	.0069	-.0391
.800	1.01	6.05	.0318	.0153	-.0520	.0319	.0153	-.0520	.0067	.0062	-.0102	.0252	.0091	-.0418
.802	1.00	9.04	.0396	.0198	-.0614	.0396	.0198	-.0614	.0099	.0072	-.0132	.0297	.0126	-.0482
.802	1.02	.05	.0211	.0097	-.0392	.0211	.0097	-.0392	.0025	.0053	-.0063	.0186	.0044	-.0329
.602	1.01	.07	.0265	.0107	-.0480	.0265	.0107	-.0480	.0051	.0050	-.0095	.0215	.0058	-.0384
.599	2.02	.06	.0656	-.0460	-.1113	.0421	.0134	-.0738	.0093	.0048	-.0155	.0328	.0086	-.0582
.600	3.06	.02	.0744	-.1057	-.1219	.0351	.0111	-.0607	.0076	.0047	-.0131	.0275	.0064	-.0476
.601	4.03	.05	.0939	-.1599	-.1514	.0375	.0120	-.0650	.0083	.0048	-.0139	.0292	.0072	-.0510

Table 18. Concluded

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
.599	5.56	.01	.1209	-.2502	-.1902	.0379	.0113	-.0663	.0092	.0048	-.0150	.0288	.0066	-.0514
.599	1.01	.07	.0287	.0106	-.0493	.0287	.0106	-.0493	.0052	.0048	-.0096	.0235	.0058	-.0398
.600	1.01	-2.96	.0210	.0089	-.0394	.0210	.0089	-.0394	.0017	.0046	-.0059	.0193	.0043	-.0335
.600	1.01	.04	.0291	.0111	-.0490	.0291	.0111	-.0490	.0053	.0049	-.0097	.0238	.0062	-.0393
.601	1.00	3.08	.0342	.0141	-.0554	.0343	.0141	-.0554	.0076	.0054	-.0118	.0266	.0087	-.0436
.599	1.00	5.04	.0408	.0184	-.0637	.0409	.0184	-.0637	.0112	.0063	-.0158	.0297	.0121	-.0479
.602	.99	9.03	.0465	.0227	-.0707	.0466	.0227	-.0707	.0141	.0076	-.0190	.0325	.0151	-.0517
.599	1.01	-2.97	.0205	.0088	-.0392	.0205	.0088	-.0392	.0017	.0047	-.0059	.0188	.0041	-.0333
.600	1.01	.03	.0282	.0108	-.0486	.0282	.0108	-.0486	.0052	.0049	-.0096	.0231	.0059	-.0390

Table 19. Aeropropulsive Characteristics for HI Nozzle With Tails Off and $\delta_v = 10°$

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
.600	1.03	.00	.0148	.0055	-.0276	.0148	.0055	-.0276	.0023	.0050	-.0055	.0125	.0005	-.0221
.599	2.03	.00	.0435	-.0567	-.0745	.0278	.0079	-.0529	.0059	.0049	-.0108	.0219	.0030	-.0421
.601	3.02	.02	.0323	-.1168	-.0478	.0142	.0056	-.0278	.0031	.0049	-.0065	.0112	.0007	-.0213
.600	3.98	-.03	.0473	-.1761	-.0700	.0176	.0067	-.0344	.0039	.0049	-.0076	.0138	.0017	-.0267
.600	5.63	-.05	.0628	-.2813	-.0876	.0188	.0053	-.0357	.0040	.0049	-.0079	.0148	.0004	-.0278
.600	6.00	-.03	.0665	-.3059	-.0913	.0191	.0047	-.0357	.0042	.0049	-.0081	.0149	-.0003	-.0276
.599	1.03	.00	.0132	.0054	-.0270	.0132	.0054	-.0270	.0023	.0051	-.0055	.0109	.0003	-.0214
.601	1.03	-3.02	.0077	.0044	-.0225	.0077	.0044	-.0225	-.0003	.0050	-.0031	.0079	-.0005	-.0194
.601	1.03	.00	.0129	.0053	-.0268	.0129	.0053	-.0268	.0024	.0050	-.0056	.0105	.0002	-.0211
.600	1.03	3.02	.0165	.0062	-.0289	.0165	.0062	-.0289	.0048	.0054	-.0077	.0117	.0009	-.0212
.599	1.03	5.99	.0217	.0088	-.0348	.0218	.0088	-.0348	.0072	.0060	-.0099	.0146	.0028	-.0249
.601	1.02	8.96	.0267	.0118	-.0404	.0268	.0118	-.0404	.0100	.0071	-.0129	.0168	.0047	-.0275
.598	1.03	-3.03	.0075	.0046	-.0226	.0074	.0046	-.0226	-.0003	.0050	-.0031	.0077	-.0004	-.0195
.599	5.64	-3.04	.0440	-.2859	-.0852	.0146	.0042	-.0330	.0016	.0048	-.0058	.0132	-.0005	-.0272
.600	5.62	-.04	.0626	-.2815	-.0876	.0185	.0051	-.0357	.0041	.0049	-.0080	.0145	.0002	-.0276
.599	5.58	2.98	.0808	-.2755	-.0902	.0221	.0065	-.0385	.0065	.0053	-.0100	.0156	.0012	-.0285
.600	5.58	5.97	.0997	-.2690	-.0940	.0265	.0087	-.0425	.0089	.0061	-.0124	.0176	.0026	-.0302
.601	5.59	8.97	.1192	-.2611	-.0995	.0318	.0116	-.0481	.0122	.0074	-.0160	.0196	.0043	-.0322
.601	1.03	-.03	.0131	.0056	-.0268	.0131	.0056	-.0268	.0022	.0051	-.0054	.0109	.0006	-.0214
1.200	.89	-.02	-.0027	.0180	-.0015	-.0027	.0180	-.0015	-.0039	.0055	.0036	.0012	.0125	-.0051
1.199	1.99	-.01	.0055	.0006	-.0149	.0017	.0162	-.0097	-.0033	.0055	.0030	.0049	.0106	-.0126
1.199	3.99	-.01	.0110	-.0285	-.0220	.0035	.0175	-.0130	-.0026	.0056	.0023	.0061	.0119	-.0153
1.199	5.61	-.04	.0182	-.0540	-.0330	.0072	.0175	-.0200	-.0022	.0056	.0019	.0094	.0119	-.0219
1.198	7.97	-.04	.0269	-.0926	-.0441	.0108	.0163	-.0253	-.0014	.0056	.0011	.0122	.0108	-.0264
1.198	10.01	-.04	.0314	-.1269	-.0482	.0108	.0142	-.0244	-.0010	.0055	.0007	.0118	.0086	-.0251
1.201	11.02	-.04	.0338	-.1427	-.0502	.0112	.0133	-.0241	-.0007	.0055	.0002	.0118	.0078	-.0243
1.202	.88	.01	-.0029	.0184	-.0015	-.0029	.0184	-.0015	-.0036	.0056	.0032	.0007	.0128	-.0048
1.198	.87	-3.02	-.0194	.0194	.0104	-.0194	.0194	.0104	-.0175	.0066	.0160	-.0018	.0128	-.0055
1.201	.88	.02	-.0026	.0185	-.0017	-.0026	.0185	-.0017	-.0034	.0056	.0030	.0008	.0129	-.0047
1.200	.88	3.01	.0163	.0210	-.0187	.0163	.0210	-.0187	.0111	.0064	-.0104	.0052	.0146	-.0083
1.202	.83	5.96	.0365	.0261	-.0368	.0365	.0261	-.0368	.0260	.0087	-.0249	.0105	.0174	-.0118
1.205	.80	9.00	.0496	.0345	-.0503	.0497	.0345	-.0503	.0361	.0128	-.0368	.0136	.0218	-.0135
1.199	.87	-3.01	-.0192	.0196	.0105	-.0193	.0196	.0105	-.0175	.0067	.0159	-.0018	.0129	-.0054
1.200	5.64	-3.03	.0011	-.0540	-.0247	-.0062	.0183	-.0117	-.0159	.0065	.0143	.0097	.0118	-.0259
1.202	5.51	-.01	.0192	-.0516	-.0332	.0084	.0181	-.0205	-.0017	.0056	.0013	.0101	.0125	-.0219
1.199	5.59	3.02	.0391	-.0510	-.0444	.0243	.0195	-.0315	.0130	.0065	-.0123	.0114	.0130	-.0192
1.199	5.59	5.96	.0610	-.0465	-.0591	.0427	.0231	-.0462	.0267	.0088	-.0257	.0160	.0143	-.0205
1.199	5.59	8.98	.0733	-.0382	-.0645	.0514	.0304	-.0515	.0361	.0128	-.0370	.0154	.0176	-.0145
.802	1.05	.02	.0084	.0061	-.0171	.0084	.0061	-.0171	-.0002	.0055	-.0025	.0086	.0006	-.0146
.801	2.05	.02	.0337	-.0291	-.0577	.0249	.0077	-.0456	.0034	.0053	-.0078	.0214	.0024	-.0378
.799	2.99	.00	.0225	-.0624	-.0332	.0124	.0058	-.0221	.0009	.0052	-.0041	.0115	.0006	-.0181
.798	4.05	-.02	.0351	-.0984	-.0529	.0179	.0073	-.0322	.0019	.0052	-.0054	.0160	.0021	-.0269
.800	5.62	-.02	.0444	-.1544	-.0639	.0196	.0067	-.0347	.0024	.0052	-.0060	.0172	.0015	-.0287

Table 19. Concluded

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
.803	6.09	-.03	.0470	-.1701	-.0666	.0201	.0063	-.0350	.0025	.0052	-.0061	.0177	.0011	-.0289
.799	7.00	-.04	.0519	-.2046	-.0721	.0204	.0056	-.0353	.0027	.0051	-.0064	.0177	.0005	-.0288
.801	1.05	.02	.0103	.0057	-.0179	.0103	.0057	-.0179	.0000	.0054	-.0027	.0103	.0003	-.0152
.802	1.05	-3.01	.0074	.0056	-.0164	.0073	.0056	-.0164	-.0013	.0054	-.0020	.0086	.0002	-.0144
.800	1.05	.00	.0110	.0059	-.0180	.0110	.0059	-.0180	-.0002	.0054	-.0024	.0112	.0005	-.0156
.801	1.05	3.02	.0140	.0069	-.0199	.0140	.0069	-.0199	.0013	.0055	-.0034	.0127	.0014	-.0165
.802	1.05	5.99	.0183	.0085	-.0244	.0184	.0085	-.0244	.0031	.0059	-.0050	.0152	.0026	-.0194
.800	1.06	8.98	.0277	.0120	-.0365	.0277	.0121	-.0365	.0071	.0069	-.0090	.0206	.0051	-.0275
.899	1.06	-.01	.0056	.0051	-.0117	.0056	.0051	-.0117	-.0014	.0060	-.0012	.0070	-.0009	-.0105
.898	2.00	.02	.0254	-.0217	-.0440	.0186	.0062	-.0345	.0011	.0056	-.0050	.0175	.0006	-.0296
.900	2.97	-.04	.0223	-.0476	-.0362	.0145	.0058	-.0274	.0001	.0057	-.0035	.0144	.0001	-.0239
.901	4.03	-.03	.0278	-.0762	-.0438	.0144	.0064	-.0277	.0002	.0057	-.0037	.0142	.0007	-.0240
.895	5.65	-.04	.0367	-.1230	-.0550	.0168	.0064	-.0316	.0009	.0056	-.0045	.0160	.0009	-.0271
.901	7.76	-.03	.0458	-.1817	-.0653	.0181	.0048	-.0330	.0013	.0055	-.0051	.0168	-.0007	-.0279
.904	1.07	.02	.0053	.0050	-.0116	.0053	.0050	-.0116	-.0014	.0060	-.0012	.0067	-.0010	-.0104
.900	1.06	-3.03	.0054	.0052	-.0129	.0054	.0052	-.0129	-.0002	.0059	-.0026	.0056	-.0007	-.0102
.900	1.06	.01	.0063	.0053	-.0121	.0063	.0053	-.0121	-.0014	.0060	-.0012	.0077	-.0007	-.0109
.901	1.06	3.02	.0064	.0055	-.0106	.0064	.0055	-.0106	-.0027	.0058	.0009	.0091	-.0003	-.0115
.897	1.07	5.98	.0075	.0057	-.0115	.0075	.0057	-.0115	-.0018	.0057	.0007	.0094	.0000	-.0121
.900	1.08	8.98	.0181	.0082	-.0204	.0181	.0082	-.0204	.0008	.0063	-.0004	.0173	.0019	-.0200
.900	1.06	-3.03	.0046	.0052	-.0125	.0046	.0052	-.0125	-.0003	.0059	-.0025	.0049	-.0008	-.0100
.901	5.58	-3.03	.0278	-.1211	-.0548	.0150	.0056	-.0320	.0020	.0054	-.0062	.0129	.0002	-.0258
.901	5.59	-.04	.0356	-.1200	-.0541	.0162	.0062	-.0312	.0007	.0057	-.0043	.0155	.0005	-.0269
.900	5.62	3.00	.0423	-.1192	-.0527	.0160	.0067	-.0297	-.0002	.0056	-.0028	.0162	.0012	-.0268
.896	5.59	5.97	.0499	-.1172	-.0530	.0171	.0075	-.0298	.0007	.0056	-.0029	.0164	.0019	-.0269
.899	5.61	8.97	.0681	-.1120	-.0600	.0289	.0105	-.0369	.0036	.0063	-.0039	.0253	.0042	-.0330

Table 20. Aeropropulsive Characteristics for HI Nozzle With Two Tails and $\delta_v = 10°$

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
1.201	.86	-.02	-.0110	.0235	.0118	-.0110	.0235	.0118	-.0134	.0102	.0170	.0024	.0133	-.0052
1.201	1.97	-.01	-.0036	.0062	-.0013	-.0073	.0213	.0038	-.0125	.0102	.0160	.0051	.0111	-.0122
1.202	4.03	-.02	.0027	-.0236	-.0106	-.0049	.0227	-.0015	-.0126	.0102	.0164	.0077	.0126	-.0180
1.201	5.66	-.03	.0111	-.0492	-.0232	.0001	.0228	-.0102	-.0119	.0102	.0157	.0119	.0126	-.0259
1.200	7.96	-.02	.0208	-.0864	-.0362	.0047	.0219	-.0175	-.0105	.0102	.0141	.0152	.0117	-.0316
1.198	9.99	-.03	.0246	-.1207	-.0399	.0041	.0200	-.0162	-.0104	.0102	.0140	.0145	.0097	-.0302
1.200	10.96	-.02	.0265	-.1369	-.0417	.0039	.0188	-.0157	-.0102	.0102	.0138	.0141	.0086	-.0294
1.199	.86	.02	-.0130	.0235	.0128	-.0130	.0235	.0128	-.0131	.0103	.0167	.0001	.0133	-.0038
1.200	.86	-3.01	-.0500	.0259	.0559	-.0500	.0259	.0559	-.0468	.0122	.0593	-.0032	.0136	-.0035
1.201	.85	.01	-.0128	.0239	.0127	-.0128	.0239	.0127	-.0128	.0103	.0164	.0000	.0137	-.0036
1.200	.84	3.01	.0238	.0255	-.0303	.0238	.0255	-.0303	.0207	.0118	-.0265	.0031	.0137	-.0038
1.200	.84	6.00	.0545	.0302	-.0642	.0546	.0302	-.0642	.0469	.0156	-.0595	.0076	.0145	-.0047
1.200	.80	8.99	.0640	.0384	-.0707	.0640	.0384	-.0707	.0543	.0200	-.0674	.0097	.0183	-.0033
1.201	.86	-3.02	-.0503	.0259	.0564	-.0503	.0259	.0564	-.0471	.0123	.0598	-.0032	.0137	-.0033
1.200	5.59	-3.02	-.0298	-.0473	.0208	-.0370	.0243	.0337	-.0448	.0122	.0575	.0078	.0121	-.0238
1.201	5.58	-.02	.0120	-.0477	-.0235	.0011	.0231	-.0106	-.0111	.0102	.0147	.0122	.0129	-.0253
1.200	5.60	2.96	.0510	-.0454	-.0644	.0364	.0250	-.0515	.0216	.0117	-.0269	.0148	.0133	-.0246
1.201	5.59	5.99	.0705	-.0399	-.0747	.0523	.0295	-.0618	.0385	.0151	-.0465	.0137	.0144	-.0153
1.200	5.58	8.99	.0928	-.0314	-.0963	.0709	.0370	-.0834	.0542	.0200	-.0669	.0167	.0170	-.0165
1.199	.85	.00	-.0125	.0240	.0133	-.0125	.0240	.0133	-.0136	.0103	.0173	.0011	.0138	-.0041
.900	1.05	-.01	.0051	.0097	-.0160	.0051	.0097	-.0160	.0029	.0102	-.0113	.0022	-.0005	-.0047
.900	2.01	-.03	.0278	-.0178	-.0525	.0208	.0103	-.0428	.0077	.0101	-.0192	.0131	.0002	-.0237
.900	3.03	.00	.0206	-.0453	-.0362	.0126	.0094	-.0273	.0055	.0099	-.0155	.0071	-.0006	-.0118
.898	4.00	-.02	.0321	-.0716	-.0547	.0187	.0106	-.0387	.0070	.0100	-.0180	.0117	.0006	-.0207
.901	5.60	-.02	.0406	-.1156	-.0653	.0211	.0107	-.0424	.0071	.0101	-.0182	.0140	.0006	-.0242
.901	7.65	-.05	.0507	-.1745	-.0773	.0234	.0093	-.0455	.0081	.0100	-.0197	.0153	-.0007	-.0258
.901	1.05	.01	.0067	.0094	-.0162	.0067	.0094	-.0162	.0026	.0101	-.0108	.0042	-.0007	-.0054
.901	1.06	-3.01	-.0047	.0094	-.0008	-.0047	.0094	-.0008	-.0070	.0102	.0037	.0023	-.0008	-.0045
.898	1.05	-.03	.0082	.0098	-.0181	.0082	.0098	-.0181	.0037	.0100	-.0125	.0045	-.0003	-.0055
.901	1.05	3.01	.0183	.0105	-.0314	.0183	.0105	-.0314	.0114	.0104	-.0243	.0069	.0001	-.0071
.898	1.04	5.01	.0264	.0117	-.0429	.0264	.0117	-.0429	.0202	.0114	-.0369	.0062	.0004	-.0060
.901	1.05	9.00	.0395	.0154	-.0547	.0396	.0154	-.0547	.0249	.0135	-.0426	.0147	.0019	-.0121
.900	1.06	-3.01	-.0046	.0092	-.0011	-.0046	.0092	-.0011	-.0069	.0101	.0035	.0022	-.0009	-.0046
.901	5.57	-3.02	.0211	-.1167	-.0480	.0083	.0097	-.0252	-.0028	.0098	-.0032	.0111	-.0001	-.0220
.901	5.56	-.03	.0406	-.1147	-.0646	.0212	.0105	-.0419	.0068	.0101	-.0177	.0144	.0004	-.0242
.898	5.56	2.97	.0591	-.1128	-.0819	.0331	.0121	-.0590	.0174	.0108	-.0337	.0157	.0013	-.0253
.901	5.65	6.01	.0746	-.1105	-.0942	.0417	.0145	-.0711	.0247	.0122	-.0447	.0169	.0023	-.0264
.901	5.65	9.00	.0959	-.1037	-.1060	.0565	.0195	-.0828	.0288	.0143	-.0492	.0277	.0051	-.0336
.799	1.04	-.01	.0199	.0086	-.0333	.0199	.0086	-.0333	.0122	.0083	-.0227	.0078	.0003	-.0106
.799	1.99	-.03	.0460	-.0249	-.0754	.0375	.0099	-.0636	.0179	.0082	-.0315	.0196	.0017	-.0322
.801	3.02	.00	.0356	-.0602	-.0533	.0254	.0086	-.0421	.0141	.0081	-.0256	.0113	.0005	-.0165
.799	4.02	-.01	.0479	-.0949	-.0724	.0308	.0097	-.0520	.0158	.0082	-.0281	.0150	.0016	-.0240
.801	5.63	-.03	.0578	-.1515	-.0844	.0331	.0093	-.0552	.0164	.0082	-.0289	.0167	.0011	-.0264

Table 20. Concluded

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
.800	6.00	-.04	.0594	-.1653	-.0865	.0328	.0091	-.0552	.0163	.0082	-.0287	.0165	.0009	-.0265
.800	6.98	-.05	.0648	-.2011	-.0923	.0335	.0081	-.0556	.0163	.0081	-.0288	.0172	.0000	-.0268
.799	1.04	.01	.0199	.0084	-.0333	.0199	.0084	-.0333	.0122	.0083	-.0228	.0077	.0002	-.0106
.803	1.05	-3.02	.0043	.0083	-.0134	.0042	.0083	-.0134	-.0019	.0083	-.0033	.0061	.0000	-.0101
.799	1.04	-.02	.0204	.0087	-.0334	.0204	.0087	-.0334	.0120	.0083	-.0225	.0084	.0004	-.0109
.800	1.04	3.01	.0351	.0105	-.0512	.0351	.0105	-.0512	.0255	.0095	-.0410	.0096	.0010	-.0102
.800	1.04	5.97	.0483	.0137	-.0694	.0484	.0137	-.0694	.0376	.0120	-.0584	.0107	.0017	-.0110
.798	1.04	9.00	.0599	.0186	-.0838	.0599	.0186	-.0838	.0451	.0154	-.0690	.0148	.0032	-.0148
.799	1.04	-.03	.0195	.0084	-.0329	.0195	.0084	-.0329	.0120	.0082	-.0225	.0075	.0002	-.0104
.600	1.03	.01	.0236	.0090	-.0386	.0236	.0090	-.0386	.0124	.0076	-.0212	.0112	.0015	-.0174
.601	1.99	.01	.0594	-.0500	-.0940	.0443	.0116	-.0731	.0195	.0076	-.0316	.0247	.0040	-.0415
.601	3.05	-.01	.0483	-.1147	-.0680	.0299	.0095	-.0475	.0144	.0074	-.0239	.0155	.0020	-.0237
.600	3.99	-.03	.0635	-.1735	-.0901	.0336	.0104	-.0542	.0157	.0075	-.0256	.0179	.0030	-.0285
.600	5.59	-.03	.0780	-.2752	-.1067	.0342	.0090	-.0551	.0163	.0075	-.0264	.0180	.0015	-.0287
.601	5.99	-.04	.0809	-.3003	-.1099	.0337	.0087	-.0545	.0162	.0075	-.0263	.0175	.0012	-.0282
.598	1.03	.01	.0254	.0088	-.0395	.0254	.0088	-.0395	.0126	.0075	-.0214	.0128	.0013	-.0181
.597	1.03	-3.03	.0096	.0085	-.0204	.0095	.0085	-.0204	-.0011	.0075	-.0029	.0107	.0010	-.0175
.601	1.03	-.01	.0258	.0089	-.0396	.0258	.0089	-.0396	.0127	.0075	-.0215	.0131	.0014	-.0181
.598	1.02	3.01	.0399	.0110	-.0569	.0400	.0110	-.0569	.0263	.0086	-.0400	.0137	.0023	-.0169
.600	1.02	5.97	.0569	.0152	-.0792	.0569	.0153	-.0792	.0402	.0115	-.0593	.0167	.0038	-.0199
.599	1.03	8.97	.0723	.0217	-.1010	.0724	.0218	-.1010	.0499	.0153	-.0733	.0225	.0065	-.0277
.601	1.03	-3.02	.0095	.0082	-.0205	.0095	.0082	-.0205	-.0008	.0075	-.0033	.0103	.0007	-.0172
.601	5.66	-3.03	.0468	-.2817	-.0654	.0176	.0078	-.0334	.0020	.0073	-.0071	.0157	.0005	-.0263
.601	5.58	-.02	.0779	-.2740	-.1067	.0343	.0092	-.0553	.0163	.0075	-.0265	.0180	.0016	-.0287
.600	5.56	2.96	.1090	-.2678	-.1280	.0508	.0119	-.0767	.0306	.0090	-.0459	.0202	.0029	-.0308
.600	5.56	5.97	.1387	-.2596	-.1484	.0660	.0166	-.0972	.0441	.0120	-.0646	.0220	.0046	-.0326
.601	5.61	8.97	.1636	-.2521	-.1622	.0760	.0219	-.1107	.0518	.0157	-.0757	.0242	.0062	-.0350
.600	1.03	-.01	.0242	.0085	-.0389	.0242	.0085	-.0389	.0125	.0075	-.0214	.0116	.0010	-.0176

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OF POOR QUALITY

Table 21. Aeropropulsive Characteristics for HI Nozzle With Three Tails and $\delta_v = 10°$

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
1.200	.87	-.02	-.0001	.0252	-.0090	-.0001	.0252	-.0090	-.0052	.0113	.0038	.0051	.0139	-.0128
1.198	2.03	-.02	.0060	.0070	-.0185	.0020	.0232	-.0131	-.0052	.0114	.0041	.0072	.0118	-.0171
1.199	4.04	-.02	.0126	-.0225	-.0271	.0050	.0243	-.0179	-.0042	.0114	.0030	.0092	.0129	-.0210
1.201	5.62	-.02	.0199	-.0471	-.0378	.0089	.0245	-.0248	-.0036	.0114	.0025	.0125	.0131	-.0274
1.200	7.97	-.02	.0277	-.0851	-.0474	.0116	.0234	-.0287	-.0032	.0114	.0023	.0148	.0120	-.0310
1.199	10.01	-.04	.0322	-.1195	-.0515	.0117	.0213	-.0278	-.0033	.0113	.0024	.0150	.0100	-.0302
1.199	10.97	-.04	.0345	-.1355	-.0537	.0119	.0203	-.0277	-.0029	.0113	.0020	.0149	.0091	-.0297
1.200	.86	-2.99	-.0450	.0276	.0512	-.0451	.0276	.0512	-.0433	.0133	.0568	-.0018	.0143	-.0056
1.199	.86	.00	.0021	.0261	-.0114	.0021	.0261	-.0114	-.0038	.0114	.0018	.0059	.0147	-.0132
1.200	.86	3.01	.0452	.0279	-.0675	.0452	.0279	-.0675	.0347	.0133	-.0521	.0105	.0146	-.0154
1.202	.84	5.00	.0757	.0344	-.1035	.0758	.0344	-.1035	.0611	.0188	-.0892	.0146	.0155	-.0144
1.201	.83	6.98	.0877	.0379	-.1217	.0878	.0379	-.1217	.0713	.0214	-.1048	.0165	.0166	-.0169
.603	1.03	.00	.0251	.0092	-.0481	.0251	.0092	-.0481	.0174	.0081	-.0311	.0077	.0010	-.0170
.601	1.99	-.02	.0652	-.0502	-.1093	.0501	.0115	-.0884	.0279	.0080	-.0479	.0222	.0035	-.0406
.600	2.97	.01	.0494	-.1099	-.0753	.0316	.0097	-.0556	.0196	.0079	-.0349	.0120	.0018	-.0208
.601	3.99	-.02	.0675	-.1717	-.1011	.0378	.0112	-.0654	.0213	.0079	-.0374	.0165	.0033	-.0280
.601	5.58	-.04	.0833	-.2730	-.1186	.0397	.0099	-.0673	.0217	.0079	-.0380	.0180	.0020	-.0293
.600	5.98	-.04	.0873	-.2993	-.1228	.0402	.0095	-.0674	.0221	.0079	-.0384	.0181	.0016	-.0290
.601	1.03	.01	.0304	.0092	-.0506	.0304	.0092	-.0506	.0170	.0079	-.0310	.0133	.0012	-.0196
1.201	.85	-2.99	-.0428	.0280	.0503	-.0429	.0280	.0503	-.0431	.0132	.0566	.0002	.0148	-.0063
1.200	5.62	-3.01	-.0262	-.0453	.0202	-.0335	.0267	.0331	-.0419	.0132	.0559	.0085	.0135	-.0227
1.200	5.60	-.02	.0231	-.0459	-.0400	.0121	.0253	-.0270	-.0025	.0113	.0010	.0146	.0140	-.0280
1.200	5.60	2.98	.0725	-.0424	-.1005	.0578	.0282	-.0876	.0363	.0134	-.0532	.0215	.0148	-.0344
1.199	.85	.00	.0021	.0264	-.0103	.0021	.0264	-.0103	-.0047	.0114	.0031	.0068	.0150	-.0135
.899	1.06	.00	.0118	.0096	-.0254	.0118	.0096	-.0254	.0069	.0102	-.0183	.0049	-.0007	-.0071
.900	1.97	-.01	.0380	-.0165	-.0688	.0314	.0105	-.0597	.0157	.0101	-.0335	.0157	.0004	-.0262
.901	3.05	-.01	.0264	-.0452	-.0453	.0182	.0099	-.0363	.0101	.0099	-.0238	.0081	-.0001	-.0125
.901	4.05	-.01	.0403	-.0715	-.0675	.0268	.0114	-.0513	.0127	.0101	-.0283	.0141	.0013	-.0230
.901	5.64	-.03	.0502	-.1159	-.0805	.0306	.0115	-.0574	.0138	.0101	-.0302	.0168	.0014	-.0273
.899	7.49	-.03	.0604	-.1695	-.0928	.0336	.0103	-.0615	.0154	.0100	-.0327	.0182	.0004	-.0289
.901	1.06	.02	.0123	.0096	-.0251	.0123	.0096	-.0251	.0062	.0102	-.0172	.0061	-.0006	-.0079
.901	1.06	-3.01	.0028	.0094	-.0103	.0027	.0094	-.0103	-.0010	.0101	-.0042	.0038	-.0007	-.0061
.902	1.06	.00	.0124	.0099	-.0248	.0124	.0099	-.0248	.0062	.0102	-.0171	.0062	-.0004	-.0077
.900	1.06	3.01	.0269	.0109	-.0469	.0269	.0109	-.0469	.0190	.0108	-.0386	.0080	.0000	-.0083
.898	1.06	5.98	.0480	.0141	-.0803	.0481	.0141	-.0803	.0394	.0136	-.0718	.0087	.0005	-.0085
.900	1.06	7.99	.0731	.0189	-.1151	.0732	.0189	-.1151	.0596	.0175	-.1031	.0136	.0014	-.0120
.899	1.06	-3.00	.0019	.0090	-.0102	.0018	.0090	-.0102	-.0011	.0101	-.0044	.0029	-.0011	-.0058
.898	5.57	-3.02	.0319	-.1171	-.0635	.0190	.0100	-.0406	.0055	.0095	-.0161	.0135	.0005	-.0246
.903	5.62	-.03	.0496	-.1148	-.0797	.0302	.0115	-.0569	.0130	.0102	-.0291	.0172	.0013	-.0278
.900	5.61	2.99	.0727	-.1120	-.1066	.0466	.0138	-.0836	.0287	.0116	-.0554	.0178	.0022	-.0282
.799	1.04	-.02	.0226	.0089	-.0394	.0226	.0089	-.0394	.0136	.0086	-.0271	.0090	.0003	-.0123
.801	2.04	-.03	.0525	-.0259	-.0888	.0437	.0104	-.0767	.0234	.0086	-.0429	.0203	.0019	-.0338
.801	2.99	.00	.0444	-.0583	-.0713	.0344	.0095	-.0603	.0185	.0085	-.0349	.0160	.0010	-.0253

Table 21. Concluded

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
.800	3.98	-.02	.0507	-.0927	-.0795	.0339	.0101	-.0594	.0185	.0084	-.0348	.0155	.0017	-.0246
.800	5.62	-.07	.0614	-.1508	-.0925	.0367	.0100	-.0634	.0192	.0084	-.0359	.0175	.0016	-.0275
.800	6.00	-.05	.0636	-.1647	-.0949	.0370	.0097	-.0636	.0193	.0084	-.0359	.0177	.0013	-.0277
.800	6.99	-.03	.0692	-.2005	-.1010	.0377	.0089	-.0644	.0197	.0084	-.0366	.0180	.0005	-.0278
.801	1.04	.01	.0228	.0089	-.0397	.0228	.0089	-.0397	.0138	.0086	-.0275	.0089	.0003	-.0122
.801	1.05	-3.01	.0050	.0085	-.0151	.0049	.0085	-.0151	-.0013	.0085	-.0043	.0062	-.0001	-.0107
.799	1.04	-.02	.0226	.0090	-.0395	.0226	.0090	-.0395	.0138	.0086	-.0273	.0088	.0005	-.0122
.801	1.04	3.01	.0422	.0112	-.0675	.0422	.0112	-.0675	.0316	.0103	-.0546	.0106	.0010	-.0129
.602	1.04	5.97	.0678	.0159	-.1063	.0679	.0159	-.1063	.0551	.0142	-.0919	.0128	.0017	-.0144
.801	1.05	8.49	.0966	.0233	-.1492	.0967	.0233	-.1492	.0779	.0201	-.1280	.0188	.0032	-.0212
.601	1.03	-3.00	.0033	.0083	-.0216	.0083	.0083	-.0216	-.0003	.0079	-.0047	.0086	.0004	-.0170
.601	1.03	.00	.0283	.0090	-.0487	.0283	.0090	-.0487	.0170	.0080	-.0307	.0113	.0010	-.0180
.600	1.02	3.01	.0489	.0118	-.0776	.0489	.0118	-.0776	.0358	.0098	-.0589	.0132	.0020	-.0187
.598	1.02	5.98	.0772	.0174	-.1199	.0773	.0174	-.1199	.0610	.0141	-.0982	.0162	.0033	-.0217
.602	1.03	8.97	.1115	.0273	-.1725	.1115	.0273	-.1725	.0899	.0218	-.1440	.0216	.0055	-.0285
.600	1.03	-3.01	.0092	.0082	-.0223	.0092	.0082	-.0223	-.0003	.0079	-.0048	.0094	.0003	-.0175
.600	5.61	-3.02	.0470	-.2768	-.0882	.0180	.0082	-.0365	.0030	.0076	-.0096	.0150	.0006	-.0269
.600	5.60	-.03	.0837	-.2751	-.1188	.0399	.0095	-.0672	.0220	.0079	-.0381	.0179	.0016	-.0291
.599	5.56	2.95	.1211	-.2673	-.1520	.0628	.0132	-.1005	.0423	.0101	-.0688	.0205	.0032	-.0318
.601	1.03	-.02	.0295	.0090	-.0492	.0295	.0090	-.0492	.0167	.0079	-.0303	.0128	.0010	-.0189

Table 22. Aeropropulsive Characteristics for HI Nozzle With Four Tails and $\delta_v = 10^\circ$

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
1.206	.86	.01	-.0073	.0273	.0040	-.0073	.0273	.0040	-.0097	.0137	.0097	.0024	.0136	-.0057
1.200	1.96	-.03	-.0013	.0104	-.0073	-.0050	.0254	-.0022	-.0096	.0138	.0098	.0046	.0116	-.0121
1.200	3.98	-.03	.0056	-.0188	-.0173	-.0019	.0271	-.0083	-.0096	.0138	.0103	.0077	.0133	-.0186
1.200	5.63	-.03	.0144	-.0444	-.0304	.0034	.0273	-.0174	-.0086	.0138	.0092	.0119	.0135	-.0266
1.200	7.97	-.03	.0227	-.0823	-.0417	.0066	.0262	-.0230	-.0080	.0138	.0088	.0147	.0124	-.0318
1.200	9.99	-.04	.0270	-.1163	-.0457	.0065	.0240	-.0221	-.0078	.0138	.0085	.0142	.0103	-.0306
1.200	10.97	-.03	.0296	-.1328	-.0482	.0070	.0230	-.0222	-.0072	.0137	.0078	.0142	.0092	-.0300
1.200	.35	.03	-.0082	.0272	.0037	-.0082	.0272	.0037	-.0090	.0138	.0087	.0008	.0134	-.0051
1.199	.86	-2.97	-.0648	.0302	.0796	-.0648	.0302	.0796	-.0594	.0159	.0793	-.0054	.0143	.0003
1.200	.85	.00	-.0071	.0277	.0027	-.0071	.0277	.0027	-.0083	.0138	.0078	.0012	.0139	-.0051
1.198	.83	3.00	.0483	.0310	-.0717	.0483	.0310	-.0717	.0412	.0169	-.0618	.0071	.0141	-.0099
1.202	.82	5.96	.0834	.0375	-.1144	.0834	.0375	-.1144	.0717	.0223	-.1052	.0117	.0153	-.0092
1.199	.81	6.50	.0892	.0394	-.1234	.0892	.0394	-.1234	.0767	.0236	-.1129	.0125	.0158	-.0105
1.203	.86	-2.96	-.0647	.0302	.0796	-.0647	.0302	.0796	-.0593	.0157	.0792	-.0054	.0144	.0004
1.200	5.65	-3.01	-.0450	-.0436	.0451	-.0523	.0289	.0581	-.0575	.0158	.0776	.0052	.0132	-.0195
1.198	5.55	-.03	.0164	-.0431	-.0319	.0054	.0278	-.0191	-.0074	.0138	.0077	.0128	.0140	-.0267
1.201	5.59	2.99	.0774	-.0392	-.1083	.0627	.0310	-.0954	.0429	.0168	-.0632	.0199	.0142	-.0322
1.201	.85	.02	-.0075	.0279	.0041	-.0075	.0279	.0041	-.0095	.0137	.0095	.0020	.0142	-.0054
.901	1.04	-.02	.0133	.0129	-.0283	.0133	.0129	-.0283	.0101	.0125	-.0230	.0032	.0004	-.0052
.895	2.01	-.03	.0435	-.0149	-.0775	.0365	.0134	-.0678	.0219	.0124	-.0433	.0146	.0010	-.0244
.902	3.02	.02	.0316	-.0416	-.0539	.0236	.0127	-.0450	.0149	.0125	-.0317	.0086	.0003	-.0133
.902	4.04	-.04	.0453	-.0686	-.0764	.0319	.0141	-.0602	.0179	.0127	-.0369	.0140	.0014	-.0233
.904	5.66	-.04	.0548	-.1129	-.0891	.0352	.0144	-.0661	.0184	.0129	-.0380	.0169	.0015	-.0281
.900	7.01	-.05	.0645	-.1527	-.1010	.0396	.0134	-.0719	.0212	.0127	-.0424	.0185	.0007	-.0295
.903	1.04	.02	.0143	.0127	-.0282	.0143	.0127	-.0282	.0095	.0125	-.0223	.0048	.0002	-.0059
.902	1.05	-3.00	-.0006	.0120	-.0064	-.0006	.0120	-.0064	-.0033	.0123	-.0022	.0027	-.0003	-.0042
.901	1.04	-.03	.0154	.0131	-.0292	.0154	.0131	-.0292	.0101	.0124	-.0232	.0052	.0006	-.0060
.903	1.04	3.02	.0340	.0149	-.0574	.0340	.0149	-.0574	.0261	.0134	-.0490	.0079	.0015	-.0084
.900	1.04	6.02	.0567	.0184	-.0931	.0567	.0184	-.0931	.0484	.0163	-.0846	.0083	.0021	-.0085
.900	1.04	6.99	.0672	.0204	-.1091	.0673	.0204	-.1091	.0577	.0180	-.0994	.0096	.0024	-.0097
.899	1.05	-3.02	-.0003	.0119	-.0072	-.0003	.0119	-.0072	-.0029	.0122	-.0031	.0026	-.0003	-.0041
.901	5.60	-3.02	.0314	-.1144	-.0654	.0185	.0127	-.0425	.0055	.0119	-.0179	.0130	.0008	-.0246
.900	5.55	-.04	.0559	-.1109	-.0904	.0366	.0144	-.0676	.0195	.0127	-.0398	.0171	.0017	-.0278
.898	5.63	1.99	.0752	-.1109	-.1135	.0510	.0162	-.0903	.0330	.0138	-.0616	.0180	.0024	-.0288
.800	1.04	-.04	.0307	.0104	-.0504	.0307	.0104	-.0504	.0235	.0100	-.0416	.0072	.0003	-.0088
.800	2.04	.02	.0637	-.0246	-.1043	.0549	.0119	-.0922	.0353	.0101	-.0606	.0196	.0018	-.0316
.801	2.97	.01	.0480	-.0565	-.0737	.0380	.0106	-.0627	.0278	.0099	-.0483	.0102	.0007	-.0143
.799	4.02	-.04	.0621	-.0929	-.0959	.0451	.0117	-.0755	.0301	.0100	-.0520	.0150	.0017	-.0235
.802	5.58	-.01	.0727	-.1475	-.1089	.0482	.0113	-.0801	.0315	.0100	-.0541	.0167	.0013	-.0260
.799	6.00	-.04	.0747	-.1639	-.1111	.0480	.0111	-.0798	.0311	.0100	-.0536	.0169	.0011	-.0262
.799	7.02	-.03	.0800	-.2009	-.1171	.0483	.0100	-.0802	.0313	.0099	-.0539	.0170	.0001	-.0263
.799	1.04	.00	.0308	.0102	-.0508	.0308	.0102	-.0508	.0237	.0100	-.0419	.0072	.0001	-.0089
.801	1.04	-3.02	.0062	.0099	-.0168	.0062	.0099	-.0168	.0012	.0097	-.0087	.0049	.0001	-.0081

Table 22. Concluded

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
.802	1.04	-.03	.0311	.0105	-.0510	.0311	.0105	-.0510	.0239	.0100	-.0422	.0072	.0005	-.0088
.600	1.03	2.96	.0554	.0133	-.0848	.0554	.0133	-.0848	.0470	.0124	-.0764	.0084	.0010	-.0084
.797	1.03	5.96	.0871	.0192	-.1319	.0872	.0192	-.1319	.0763	.0176	-.1222	.0109	.0016	-.0097
.801	1.04	8.75	.1130	.0283	-.1781	.1181	.0283	-.1781	.1023	.0253	-.1642	.0158	.0029	-.0139
.601	1.02	.01	.0354	.0104	-.0574	.0354	.0104	-.0574	.0251	.0093	-.0419	.0103	.0011	-.0155
.600	2.03	-.04	.0789	-.0509	-.1264	.0631	.0134	-.1048	.0387	.0093	-.0631	.0245	.0040	-.0417
.602	3.03	-.01	.0620	-.1116	-.0910	.0440	.0109	-.0710	.0292	.0092	-.0482	.0147	.0018	-.0228
.601	4.04	-.04	.0786	-.1742	-.1148	.0483	.0122	-.0785	.0307	.0092	-.0504	.0176	.0030	-.0280
.602	1.03	-3.03	.0101	.0095	-.0220	.0101	.0095	-.0220	.0007	.0090	-.0064	.0094	.0006	-.0156
.600	1.02	-.03	.0367	.0107	-.0577	.0367	.0107	-.0577	.0247	.0092	-.0415	.0120	.0016	-.0162
.598	1.02	2.98	.0624	.0140	-.0931	.0624	.0140	-.0931	.0494	.0116	-.0775	.0130	.0024	-.0156
.600	1.02	5.98	.0967	.0208	-.1436	.0967	.0208	-.1436	.0813	.0173	-.1260	.0155	.0036	-.0176
.599	1.02	8.96	.1291	.0313	-.1936	.1292	.0313	-.1938	.1100	.0259	-.1718	.0192	.0054	-.0219
.599	1.03	-3.02	.0105	.0094	-.0223	.0104	.0094	-.0223	.0008	.0089	-.0065	.0096	.0005	-.0158
.601	3.51	-3.01	.0357	-.1435	-.0663	.0197	.0107	-.0383	.0045	.0087	-.0122	.0152	.0021	-.0262
.599	3.49	-.01	.0724	-.1404	-.1064	.0485	.0124	-.0786	.0307	.0092	-.0506	.0178	.0032	-.0280
.601	3.54	2.97	.1103	-.1372	-.1490	.0779	.0162	-.1207	.0579	.0121	-.0904	.0200	.0041	-.0303
.599	3.54	5.99	.1540	-.1282	-.2023	.1135	.0239	-.1738	.0905	.0183	-.1406	.0229	.0056	-.0332
.600	3.53	6.57	.1621	-.1255	-.2125	.1201	.0258	-.1840	.0966	.0199	-.1502	.0235	.0060	-.0338
.600	1.03	-.01	.0362	.0102	-.0577	.0362	.0102	-.0577	.0247	.0091	-.0415	.0115	.0010	-.0162
.600	5.63	-.03	.0940	-.2760	-.1326	.0499	.0108	-.0805	.0316	.0092	-.0516	.0183	.0015	-.0290
.599	6.03	-.05	.0972	-.3024	-.1362	.0496	.0102	-.0802	.0315	.0092	-.0515	.0181	.0010	-.0287
.600	1.03	.00	.0359	.0099	-.0574	.0359	.0099	-.0574	.0245	.0091	-.0412	.0114	.0008	-.0162

Table 23. Aeropropulsive Characteristics for HI Nozzle With Tails Off and $\delta_v = 20°$

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
1.200	.82	-.03	.0120	.0197	-.0260	.0120	.0197	-.0260	-.0029	.0054	.0027	.0148	.0142	-.0287
1.200	2.00	-.04	.0194	.0030	-.0384	.0132	.0167	-.0286	-.0022	.0055	.0020	.0154	.0112	-.0307
1.201	4.03	-.02	.0344	-.0225	-.0628	.0189	.0187	-.0387	-.0008	.0055	.0006	.0197	.0132	-.0393
1.201	5.64	-.06	.0475	-.0442	-.0838	.0246	.0200	-.0483	.0000	.0055	-.0002	.0246	.0145	-.0481
1.199	6.48	-.04	.0540	-.0560	-.0938	.0272	.0206	-.0522	.0005	.0055	-.0007	.0266	.0151	-.0515
1.199	.82	-.03	.0111	.0197	-.0259	.0111	.0197	-.0259	-.0029	.0055	.0027	.0140	.0142	-.0286
1.200	.84	-3.04	-.0061	.0192	-.0123	-.0061	.0192	-.0123	-.0167	.0066	.0150	.0105	.0126	-.0273
1.200	.82	-.04	.0114	.0199	-.0261	.0114	.0199	-.0261	-.0028	.0056	.0025	.0141	.0144	-.0286
1.201	.79	2.98	.0303	.0237	-.0437	.0303	.0237	-.0437	.0119	.0063	-.0111	.0185	.0174	-.0325
1.201	.77	5.98	.0468	.0305	-.0584	.0468	.0305	-.0584	.0241	.0090	-.0235	.0227	.0215	-.0349
1.204	.71	8.97	.0639	.0395	-.0771	.0640	.0395	-.0771	.0359	.0126	-.0366	.0281	.0268	-.0406
1.197	.84	-3.04	-.0055	.0193	-.0126	-.0055	.0193	-.0126	-.0165	.0066	.0149	.0111	.0127	-.0275
.603	1.00	-.02	.0262	.0119	-.0490	.0262	.0119	-.0490	.0057	.0050	-.0108	.0204	.0069	-.0383
.598	2.03	-.06	.0854	-.0379	-.1465	.0594	.0190	-.1057	.0138	.0049	-.0224	.0456	.0141	-.0833
.602	3.00	-.04	.0949	-.0905	-.1589	.0496	.0150	-.0867	.0125	.0050	-.0204	.0370	.0101	-.0663
.603	4.04	-.05	.1126	-.1477	-.1859	.0510	.0165	-.0900	.0122	.0050	-.0198	.0387	.0115	-.0702
1.200	5.57	-3.05	.0299	-.0446	-.0721	.0106	.0199	-.0371	-.0138	.0063	.0122	.0243	.0136	-.0492
1.196	5.59	-.04	.0496	-.0434	-.0842	.0267	.0207	-.0488	.0003	.0055	-.0004	.0265	.0152	-.0484
1.200	5.63	2.95	.0705	-.0391	-.0990	.0443	.0239	-.0635	.0150	.0064	-.0142	.0293	.0174	-.0493
1.200	5.62	5.35	.0883	-.0339	-.1126	.0596	.0278	-.0771	.0260	.0083	-.0250	.0336	.0196	-.0522
1.201	.82	-.05	.0129	.0203	-.0265	.0129	.0203	-.0265	-.0028	.0055	.0025	.0156	.0148	-.0289
.902	1.00	-.03	.0217	.0103	-.0411	.0217	.0103	-.0411	.0026	.0056	-.0076	.0191	.0047	-.0335
.899	1.99	-.06	.0461	-.0122	-.0822	.0351	.0118	-.0650	.0056	.0053	-.0120	.0296	.0065	-.0529
.901	3.05	-.03	.0518	-.0383	-.0897	.0312	.0102	-.0569	.0054	.0054	-.0117	.0259	.0048	-.0453
.900	4.00	-.07	.0652	-.0600	-.1117	.0379	.0126	-.0692	.0061	.0053	-.0127	.0318	.0073	-.0565
.900	1.00	-.02	.0222	.0102	-.0413	.0222	.0102	-.0413	.0027	.0056	-.0078	.0195	.0046	-.0335
.899	1.00	-3.05	.0204	.0087	-.0395	.0204	.0087	-.0395	.0038	.0053	-.0091	.0166	.0034	-.0304
.900	1.00	-.04	.0223	.0101	-.0412	.0223	.0101	-.0412	.0026	.0056	-.0076	.0197	.0045	-.0336
.899	1.00	2.98	.0240	.0119	-.0431	.0240	.0119	-.0431	.0020	.0057	-.0066	.0220	.0062	-.0366
.899	1.00	5.95	.0259	.0135	-.0455	.0259	.0135	-.0455	.0024	.0057	-.0064	.0235	.0078	-.0391
.900	.99	8.99	.0367	.0179	-.0550	.0368	.0179	-.0550	.0063	.0067	-.0085	.0305	.0112	-.0464
.898	1.00	-3.06	.0201	.0088	-.0394	.0201	.0088	-.0394	.0037	.0053	-.0090	.0164	.0035	-.0304
.899	3.46	-3.02	.0493	-.0504	-.0942	.0288	.0097	-.0572	.0064	.0049	-.0132	.0225	.0048	-.0440
.898	3.45	-.07	.0565	-.0479	-.0962	.0329	.0112	-.0591	.0055	.0053	-.0118	.0274	.0059	-.0473
.900	3.51	2.94	.0605	-.0461	-.0977	.0335	.0130	-.0601	.0049	.0056	-.0108	.0286	.0074	-.0493
.899	3.51	5.96	.0647	-.0427	-.0988	.0347	.0149	-.0612	.0057	.0059	-.0108	.0290	.0090	-.0503
.899	3.52	8.95	.0808	-.0364	-.1085	.0478	.0195	-.0709	.0093	.0069	-.0128	.0385	.0126	-.0581
.799	.99	-.06	.0243	.0110	-.0439	.0243	.0110	-.0439	.0038	.0052	-.0085	.0206	.0058	-.0354
.800	2.02	-.07	.0577	-.0172	-.1005	.0433	.0142	-.0780	.0082	.0050	-.0149	.0352	.0092	-.0631
.802	3.02	-.03	.0623	-.0483	-.1054	.0366	.0116	-.0645	.0075	.0050	-.0140	.0291	.0066	-.0505
.798	4.01	-.06	.0784	-.0785	-.1317	.0435	.0142	-.0775	.0085	.0050	-.0153	.0350	.0092	-.0622
.802	4.00	-.07	.0777	-.0774	-.1309	.0432	.0143	-.0772	.0084	.0050	-.0151	.0348	.0092	-.0621
.798	.99	-.02	.0250	.0108	-.0443	.0250	.0108	-.0443	.0038	.0051	-.0086	.0211	.0056	-.0357

Table 23. Concluded

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
.800	.99	-3.03	.0197	.0093	-.0386	.0196	.0093	-.0386	.0019	.0049	-.0070	.0177	.0043	-.0316
.800	.99	-.05	.0249	.0109	-.0442	.0249	.0109	-.0442	.0037	.0052	-.0084	.0212	.0057	-.0358
.800	.99	2.99	.0313	.0136	-.0521	.0314	.0136	-.0521	.0061	.0055	-.0107	.0252	.0081	-.0414
.799	.99	5.97	.0361	.0169	-.0588	.0361	.0169	-.0588	.0082	.0062	-.0126	.0279	.0107	-.0462
.799	.99	8.95	.0443	.0219	-.0694	.0444	.0219	-.0694	.0116	.0074	-.0160	.0328	.0145	-.0535
.799	.99	-.04	.0242	.0107	-.0438	.0242	.0107	-.0438	.0037	.0052	-.0085	.0204	.0056	-.0354
.603	1.00	-3.01	.0206	.0094	-.0407	.0206	.0094	-.0407	.0027	.0046	-.0075	.0179	.0048	-.0331
.602	1.00	-.06	.0279	.0116	-.0489	.0279	.0116	-.0489	.0057	.0048	-.0106	.0222	.0067	-.0383
.599	1.00	2.99	.0364	.0151	-.0609	.0365	.0151	-.0609	.0093	.0055	-.0145	.0272	.0096	-.0463
.600	1.00	5.94	.0458	.0204	-.0744	.0459	.0204	-.0744	.0128	.0065	-.0185	.0331	.0138	-.0559
.598	1.00	8.94	.0558	.0268	-.0888	.0559	.0268	-.0888	.0168	.0081	-.0232	.0391	.0187	-.0656
.603	1.00	-3.05	.0211	.0094	-.0407	.0211	.0094	-.0407	.0026	.0046	-.0074	.0185	.0049	-.0332
.603	4.54	-3.08	.1080	-.1824	-.1969	.0474	.0137	-.0869	.0102	.0043	-.0180	.0373	.0095	-.0690
.601	4.46	-.07	.1226	-.1729	-.2007	.0528	.0168	-.0922	.0127	.0049	-.0203	.0401	.0119	-.0719
.599	4.46	2.94	.1379	-.1661	-.2069	.0579	.0206	-.0977	.0152	.0058	-.0225	.0427	.0148	-.0752
.597	3.95	8.93	.1534	-.1209	-.2052	.0676	.0298	-.1097	.0210	.0088	-.0290	.0466	.0210	-.0808
.601	3.97	-3.07	.0986	-.1509	-.1787	.0464	.0134	-.0840	.0096	.0043	-.0171	.0368	.0091	-.0668
.601	3.97	-.04	.1121	-.1449	-.1837	.0513	.0160	-.0891	.0122	.0049	-.0196	.0391	.0111	-.0695
.600	3.97	2.92	.1248	-.1385	-.1891	.0557	.0195	-.0943	.0148	.0058	-.0222	.0409	.0138	-.0721
.599	3.96	5.92	.1385	-.1307	-.1965	.0609	.0240	-.1013	.0174	.0070	-.0250	.0435	.0170	-.0763
.599	3.96	8.94	.1526	-.1208	-.2046	.0669	.0296	-.1093	.0209	.0088	-.0288	.0460	.0208	-.0805
.601	1.00	-.04	.0288	.0109	-.0493	.0288	.0109	-.0493	.0055	.0048	-.0105	.0232	.0061	-.0388

Table 24. Aeropropulsive Characteristics for HI Nozzle With Two Tails and $\delta_v = 20°$

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
1.200	.81	.01	.0039	.0248	-.0168	.0039	.0248	-.0168	-.0117	.0102	.0151	.0156	.0147	-.0319
1.201	2.00	-.01	.0113	.0081	-.0283	.0050	.0218	-.0185	-.0113	.0102	.0149	.0163	.0116	-.0334
1.201	4.02	-.02	.0266	-.0173	-.0536	.0111	.0238	-.0296	-.0099	.0102	.0135	.0210	.0136	-.0431
1.200	5.66	-.03	.0399	-.0397	-.0748	.0169	.0250	-.0391	-.0089	.0102	.0125	.0258	.0147	-.0516
1.201	6.97	-.03	.0494	-.0578	-.0895	.0203	.0255	-.0445	-.0081	.0102	.0115	.0284	.0153	-.0561
1.201	.80	.01	.0034	.0251	-.0163	.0034	.0251	-.0163	-.0118	.0102	.0153	.0153	.0149	-.0317
1.200	.53	-2.99	-.0356	.0254	.0310	-.0357	.0254	.0310	-.0448	.0122	.0569	.0091	.0132	-.0259
1.200	.80	-.02	.0035	.0254	-.0166	.0035	.0254	-.0166	-.0117	.0103	.0152	.0152	.0152	-.0318
1.199	.77	2.99	.0414	.0292	-.0625	.0414	.0292	-.0625	.0206	.0117	-.0258	.0208	.0175	-.0366
1.201	.76	5.98	.0728	.0347	-.0982	.0728	.0347	-.0982	.0468	.0154	-.0594	.0261	.0193	-.0388
1.200	.71	9.00	.0807	.0451	-.1055	.0307	.0451	-.1055	.0527	.0197	-.0652	.0280	.0253	-.0404
1.203	.82	-3.01	-.0367	.0256	.0330	-.0367	.0256	.0330	-.0458	.0122	.0585	.0090	.0134	-.0254
1.201	5.60	-3.03	-.0035	-.0391	-.0260	-.0229	.0257	.0092	-.0433	.0121	.0561	.0204	.0136	-.0469
1.200	5.62	-.04	.0399	-.0386	-.0739	.0171	.0256	-.0385	-.0092	.0102	.0130	.0263	.0153	-.0515
1.198	5.51	1.56	.0616	-.0348	-.0983	.0375	.0272	-.0636	.0082	.0107	-.0094	.0292	.0166	-.0542
1.201	.80	-.01	.0043	.0259	-.0160	.0043	.0259	-.0160	-.0120	.0102	.0158	.0163	.0157	-.0318
.900	1.00	-.03	.0236	.0135	-.0477	.0236	.0135	-.0477	.0082	.0101	-.0201	.0154	.0035	-.0276
.900	1.96	-.04	.0499	-.0086	-.0910	.0392	.0147	-.0743	.0133	.0100	-.0281	.0259	.0047	-.0461
.899	3.01	-.03	.0582	-.0336	-.1030	.0378	.0140	-.0705	.0134	.0101	-.0284	.0244	.0038	-.0422
.900	4.03	-.03	.0705	-.0573	-.1235	.0429	.0160	-.0806	.0138	.0102	-.0289	.0292	.0058	-.0517
.901	1.00	.00	.0246	.0134	-.0485	.0246	.0134	-.0485	.0085	.0100	-.0205	.0162	.0033	-.0279
.901	1.00	-3.02	.0118	.0122	-.0303	.0118	.0122	-.0303	-.0018	.0097	-.0050	.0136	.0024	-.0253
.899	1.00	-.01	.0257	.0137	-.0491	.0257	.0137	-.0491	.0087	.0100	-.0209	.0170	.0037	-.0282
.900	1.00	2.98	.0374	.0159	-.0660	.0374	.0159	-.0660	.0179	.0108	-.0350	.0195	.0051	-.0310
.900	.99	6.00	.0458	.0182	-.0784	.0458	.0182	-.0784	.0258	.0122	-.0468	.0201	.0060	-.0316
.899	.99	9.00	.0620	.0244	-.0948	.0620	.0244	-.0948	.0312	.0146	-.0537	.0308	.0097	-.0411
.899	1.00	-3.01	.0127	.0122	-.0313	.0126	.0122	-.0313	-.0013	.0096	-.0058	.0140	.0025	-.0256
.900	3.53	-3.02	.0448	-.0483	-.0908	.0240	.0135	-.0532	.0026	.0095	-.0121	.0214	.0039	-.0410
.900	3.52	.00	.0635	-.0453	-.1100	.0395	.0152	-.0724	.0130	.0101	-.0278	.0265	.0050	-.0446
.898	3.51	.99	.0705	-.0442	-.1171	.0454	.0158	-.0794	.0169	.0104	-.0335	.0285	.0054	-.0460
.799	.99	-.02	.0374	.0131	-.0631	.0374	.0131	-.0631	.0179	.0081	-.0316	.0195	.0049	-.0314
.801	1.99	-.04	.0727	-.0142	-.1220	.0589	.0160	-.1003	.0250	.0082	-.0425	.0339	.0078	-.0578
.801	2.52	-.02	.0850	-.0275	-.1438	.0650	.0180	-.1122	.0269	.0083	-.0455	.0381	.0097	-.0667
.801	.99	-.02	.0374	.0130	-.0631	.0374	.0130	-.0631	.0180	.0082	-.0318	.0194	.0048	-.0313
.802	.99	-3.02	.0198	.0116	-.0401	.0198	.0116	-.0401	.0032	.0078	-.0113	.0166	.0038	-.0288
.799	.99	-.01	.0377	.0131	-.0634	.0377	.0131	-.0634	.0182	.0082	-.0321	.0195	.0050	-.0313
.799	.99	2.99	.0539	.0162	-.0851	.0539	.0162	-.0851	.0325	.0098	-.0519	.0215	.0064	-.0332
.800	.99	5.97	.0686	.0208	-.1056	.0686	.0208	-.1056	.0451	.0128	-.0702	.0235	.0080	-.0353
.800	.98	9.01	.0795	.0271	-.1200	.0796	.0272	-.1200	.0516	.0164	-.0796	.0280	.0107	-.0404
.801	.99	.00	.0366	.0129	-.0626	.0366	.0129	-.0626	.0179	.0082	-.0316	.0187	.0047	-.0310
.602	1.00	.00	.0372	.0135	-.0616	.0372	.0135	-.0616	.0166	.0074	-.0275	.0207	.0061	-.0341
.602	2.02	-.04	.0994	-.0347	-.1652	.0740	.0208	-.1255	.0299	.0077	-.0472	.0441	.0131	-.0782
.600	2.49	-.04	.1123	-.0590	-.1865	.0772	.0209	-.1309	.0309	.0078	-.0486	.0463	.0131	-.0823

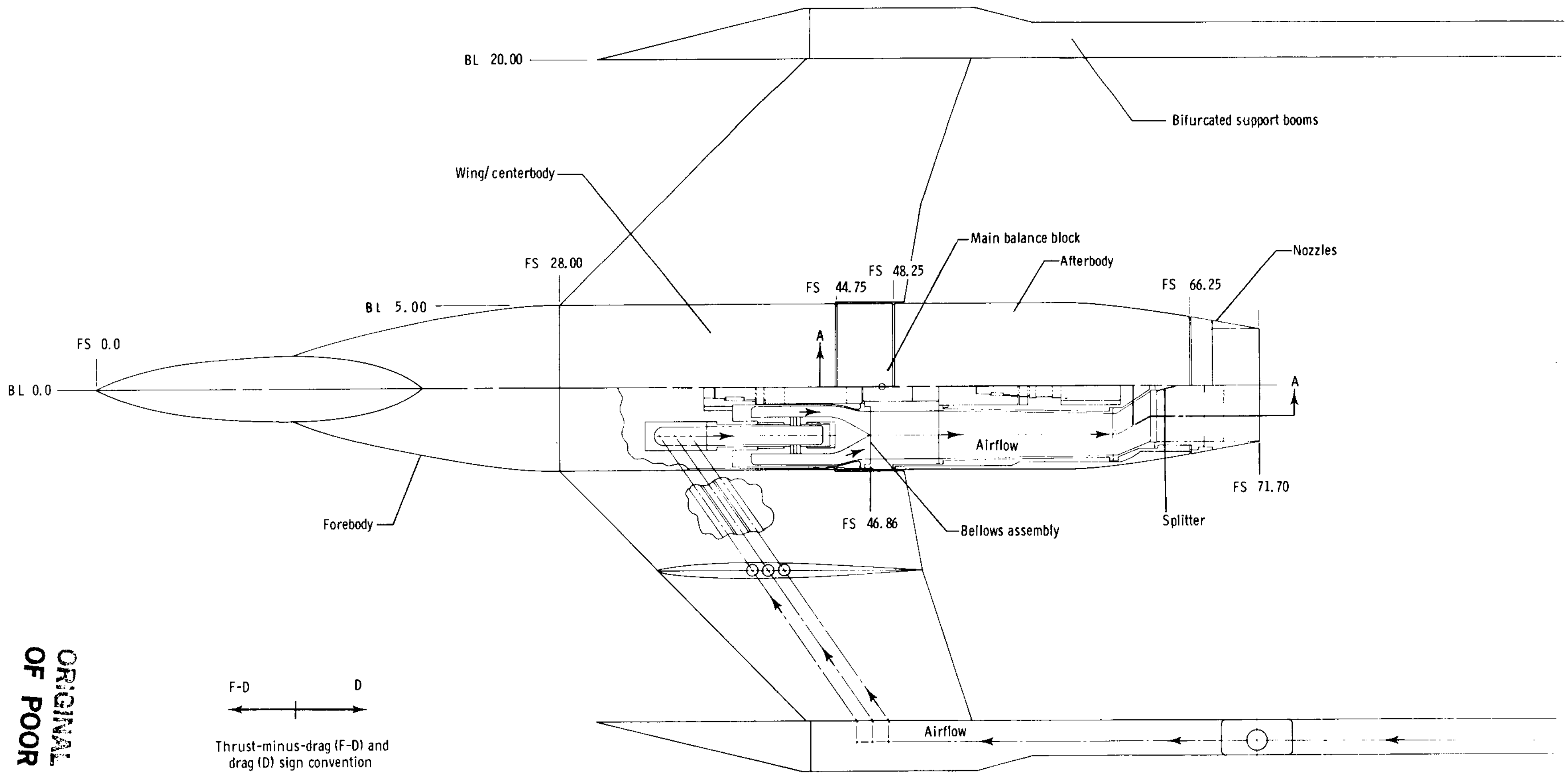
Table 24. Concluded

MACH	NPP	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLNOZ	CDNOZ	CMNOZ
.600	2.99	.00	.1106	-.0885	-.1809	.0650	.0174	-.1085	.0278	.0077	-.0438	.0373	.0097	-.0647
.600	3.51	-.02	.1143	-.1180	-.1855	.0606	.0172	-.1012	.0265	.0077	-.0417	.0341	.0095	-.0594
.601	1.00	-.01	.0387	.0134	-.0625	.0387	.0134	-.0625	.0170	.0074	-.0281	.0218	.0060	-.0345
.600	1.00	-3.02	.0209	.0120	-.0392	.0209	.0120	-.0392	.0026	.0071	-.0084	.0184	.0049	-.0308
.600	1.00	-.02	.0390	.0137	-.0624	.0390	.0137	-.0624	.0167	.0073	-.0277	.0223	.0064	-.0347
.599	.99	2.98	.0565	.0171	-.0852	.0565	.0171	-.0852	.0317	.0089	-.0480	.0248	.0082	-.0372
.599	.99	5.98	.0739	.0227	-.1088	.0739	.0227	-.1088	.0460	.0120	-.0680	.0279	.0107	-.0408
.601	.99	8.99	.0856	.0296	-.1255	.0857	.0296	-.1255	.0544	.0158	-.0802	.0313	.0137	-.0452
.602	1.00	-3.02	.0212	.0120	-.0396	.0212	.0120	-.0396	.0027	.0071	-.0086	.0185	.0049	-.0310
.600	3.03	-3.03	.0875	-.0955	-.1573	.0472	.0144	-.0840	.0129	.0069	-.0235	.0343	.0076	-.0605
.603	2.99	-.04	.1103	-.0875	-.1801	.0652	.0175	-.1082	.0282	.0077	-.0444	.0370	.0098	-.0638
.602	2.99	.96	.1180	-.0856	-.1878	.0711	.0186	-.1160	.0333	.0082	-.0515	.0378	.0104	-.0645
.601	2.99	1.96	.1258	-.0832	-.1958	.0770	.0204	-.1238	.0384	.0090	-.0585	.0386	.0114	-.0652
.600	2.99	2.96	.1342	-.0808	-.2046	.0834	.0222	-.1325	.0440	.0099	-.0662	.0395	.0123	-.0662
.601	1.00	-.02	.0381	.0132	-.0618	.0381	.0132	-.0618	.0165	.0073	-.0273	.0216	.0059	-.0344

Table 25. Tail Drag Coefficients

Empennage arrangement[a]	M	Nozzle	$C_{D,\text{tails}}$
2	0.60	AXI	0.0013
		LO	
		MED	
		HI	
	0.80	AXI	
		LO	
		MED	
		HI	
	0.90	AXI	
		LO	
		MED	
		HI	
	1.20	AXI	0.0038
		LO	
		MED	
		HI	
3	0.60	AXI	0.0017
		LO	
		MED	
		HI	
	0.80	AXI	0.0016
		LO	
		MED	
		HI	
	0.90	AXI	
		LO	
		MED	
		HI	
	1.20	AXI	0.0052
		LO	.0053
		MED	.0053
		HI	.0054
4	0.60	AXI	0.0023
		LO	
		MED	
		HI	
	0.80	AXI	0.0022
		LO	
		MED	
		HI	
	0.90	AXI	
		LO	
		MED	
		HI	
	1.20	AXI	0.0071
		LO	.0072
		MED	.0072
		HI	.0073

[a]Numbers refer to number of tails in empennage arrangement.



(a) Overall view.

Figure 1. Sketch of air-powered, twin-engine fighter afterbody model and wingtip support system with nonaxisymmetric convergent-divergent dry power nozzle. All dimensions are given in inches unless otherwise specified.

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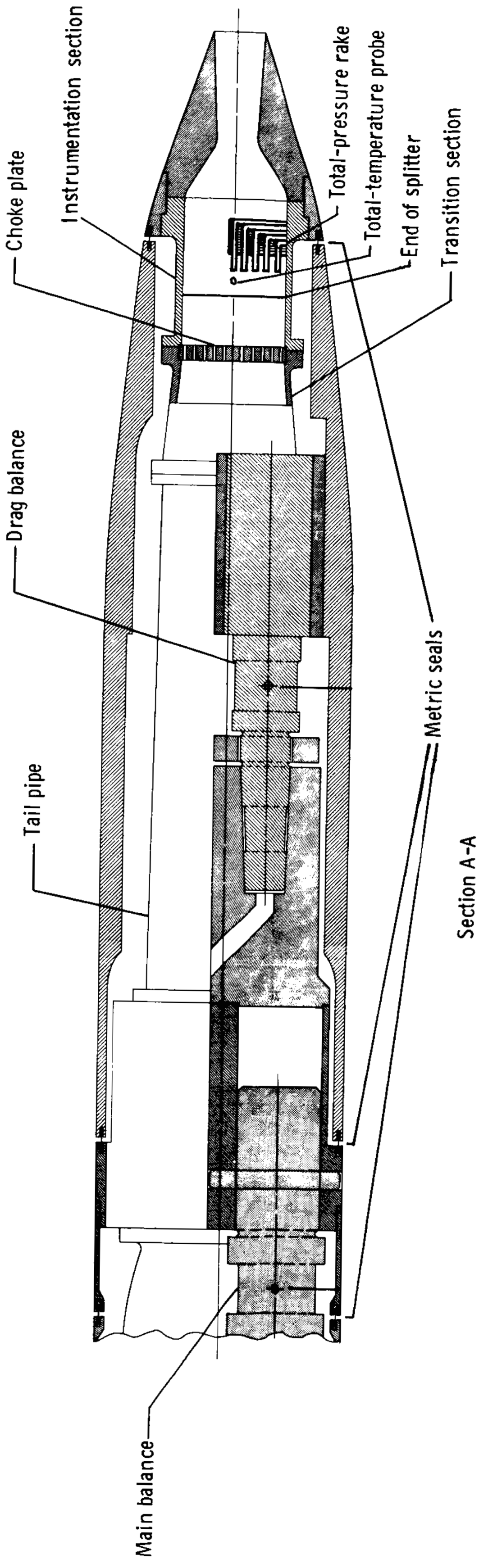
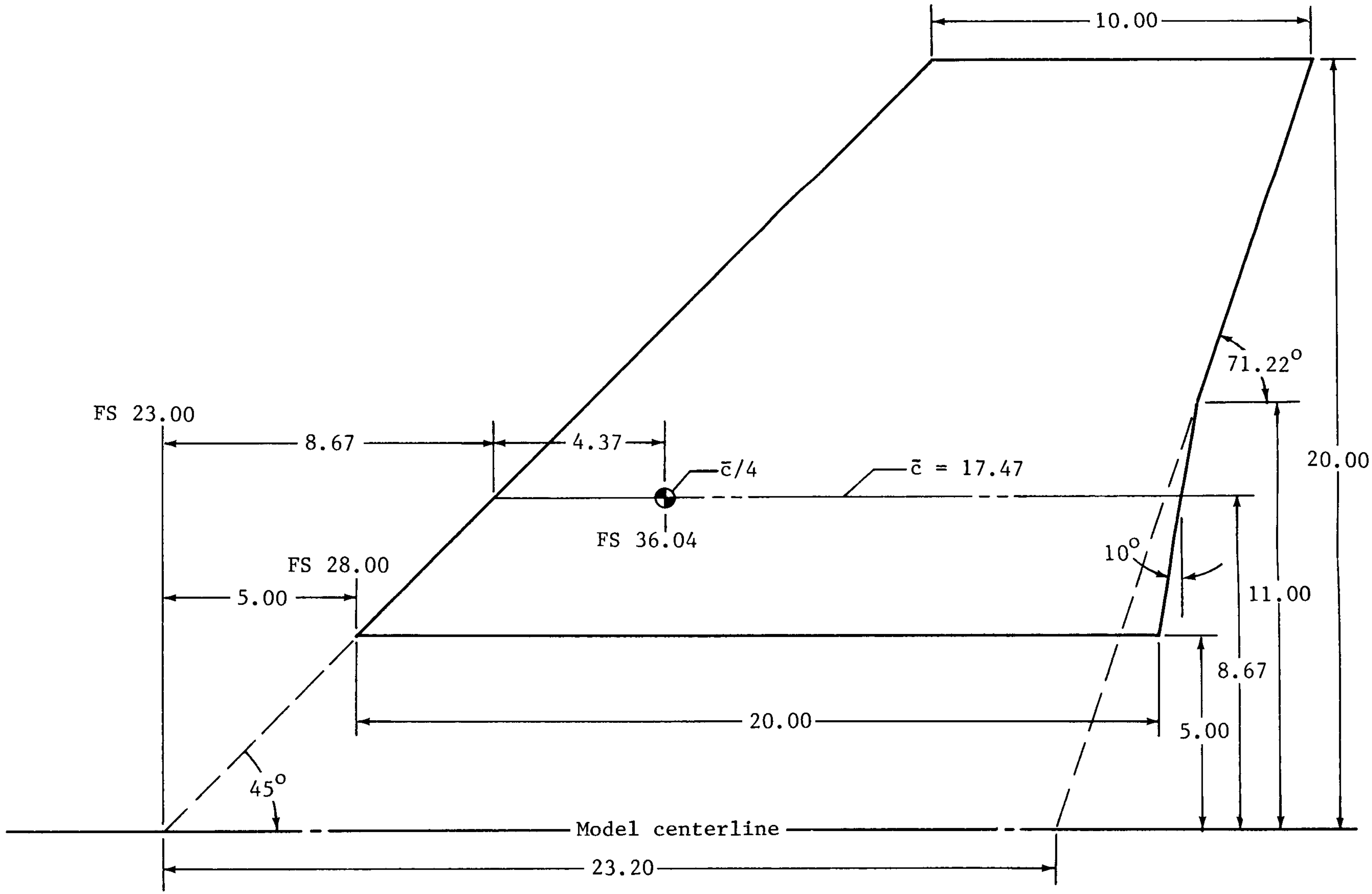


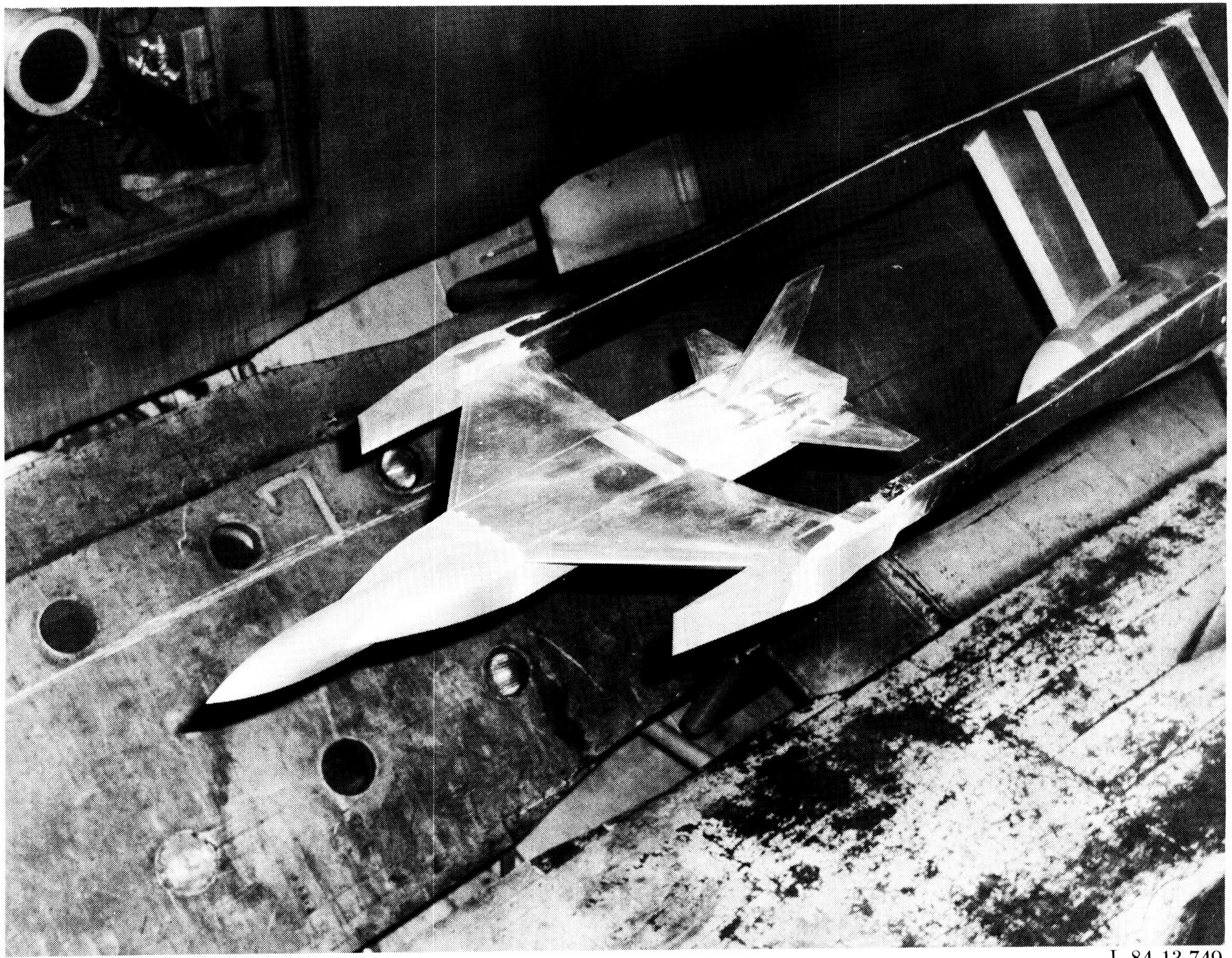
(b) Jet simulation system and balance arrangement.

Figure 1. Continued.



(c) Wing planform geometry.

Figure 1. Concluded.



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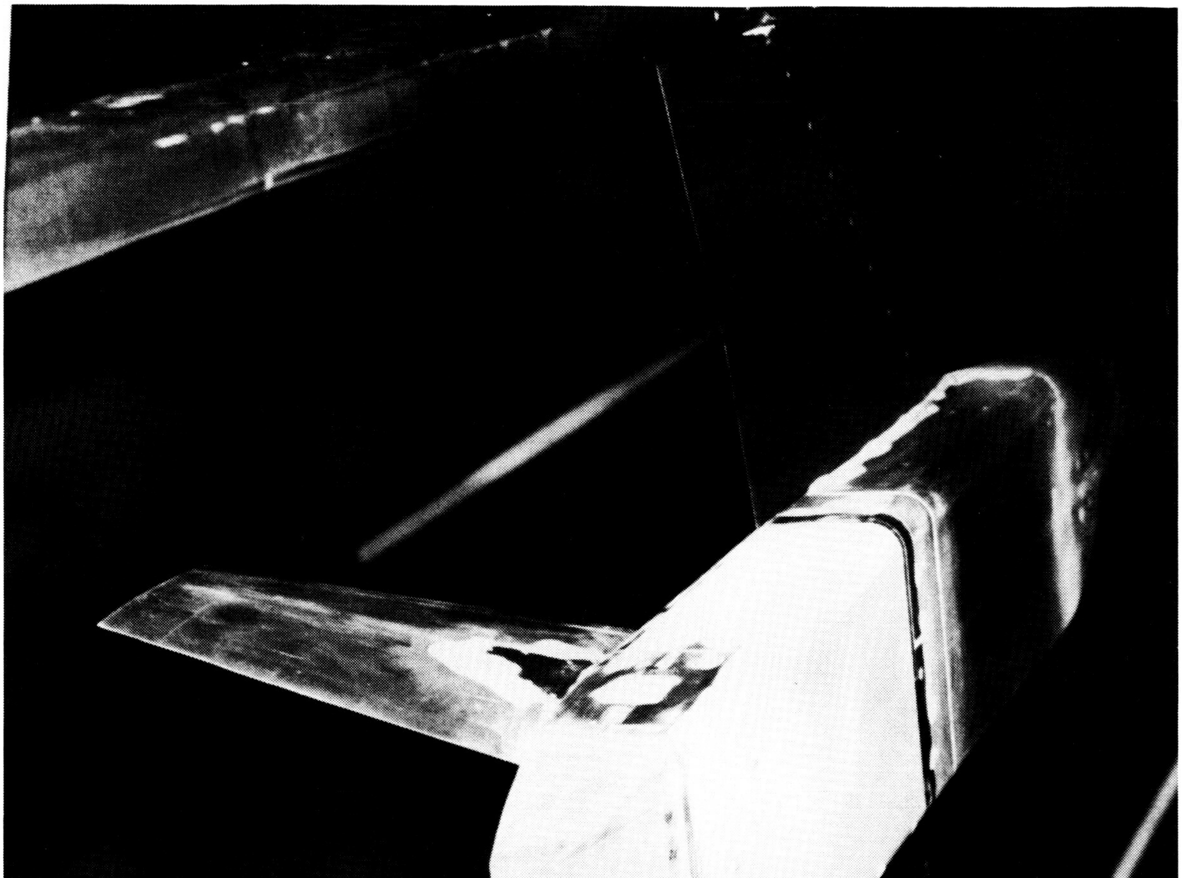
(a) Overall view.

Figure 2. Airplane model.



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(b) Medium-aspect-ratio nozzle with two tails and $\delta_v = 0°$.

Figure 2. Continued.

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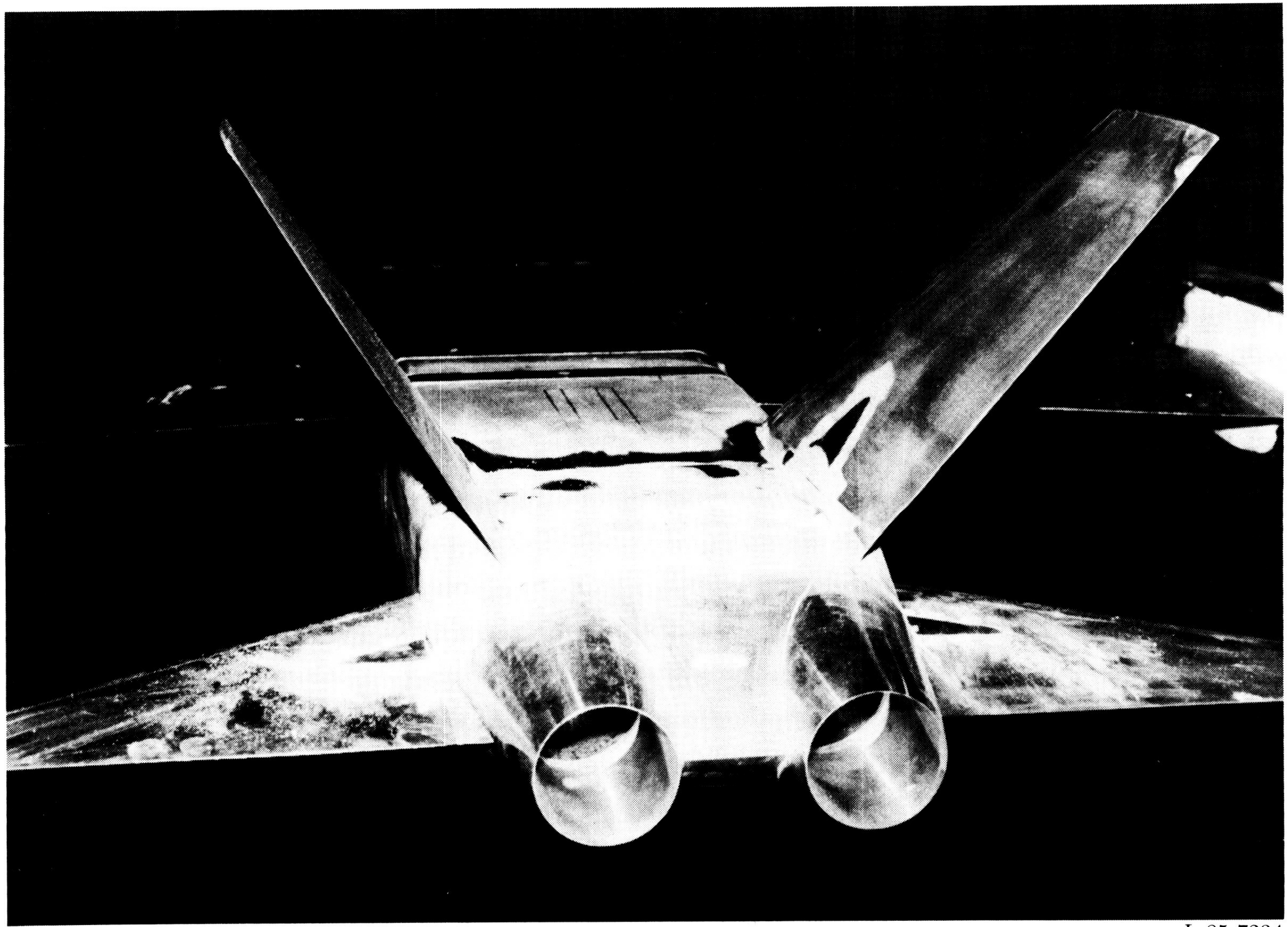

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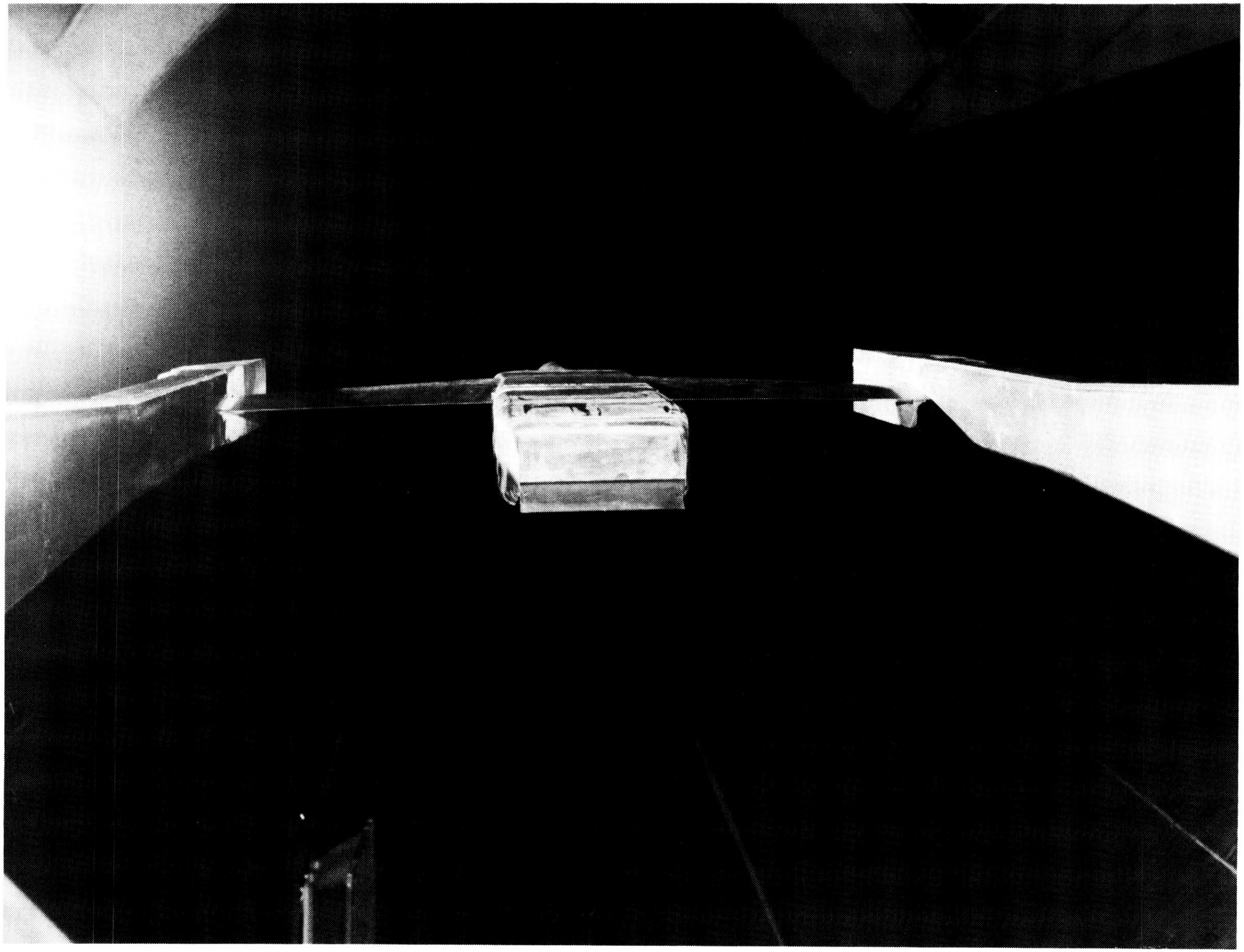
(c) Twin axisymmetric nozzles with four tails.

Figure 2. Continued.



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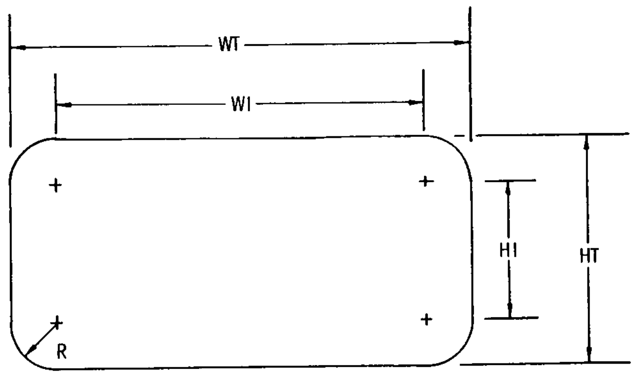
(d) High-aspect-ratio nozzle with tails off and $\delta_v = 10°$.

Figure 2. Concluded.



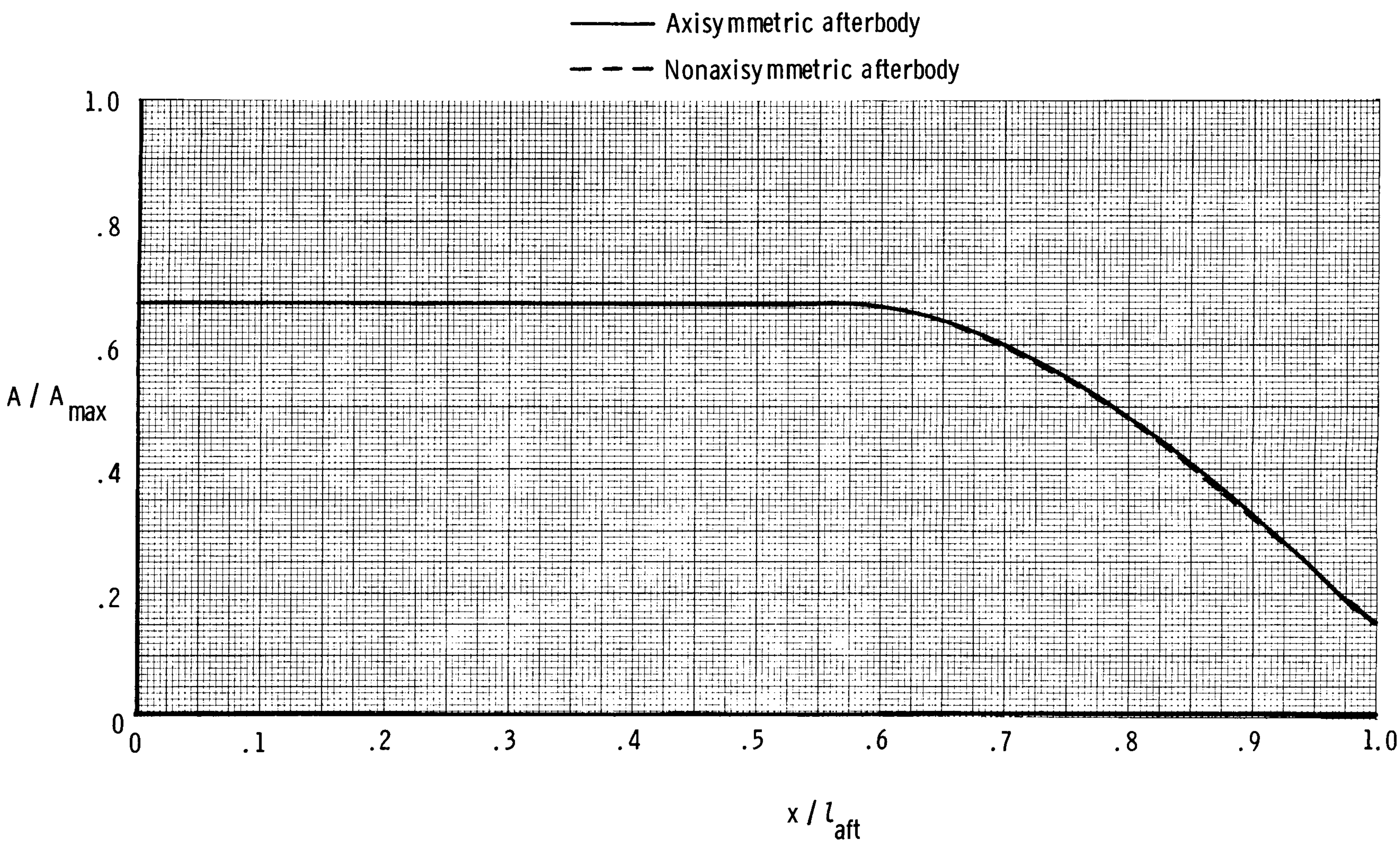
Axisymmetric afterbody and nozzle					
FS	R	HI	HT	WI	WT
61.3	1.000	2.998	5.000	7.998	10.000
62.3	1.237	2.526		7.526	
62.8	1.480	2.041		7.041	
63.3	1.762	1.476		6.476	
63.8	2.067	.866		5.866	
64.3	2.384	.231		5.231	
64.8	2.464	0.0	4.928	5.000	9.928
65.3	2.400		4.800		9.800
65.8	2.328		4.656		9.656
66.3	2.250		4.500		9.500
66.8	2.172		4.344		9.344
67.3	2.094		4.188		9.188
67.8	2.016		4.032		9.032
68.3	1.938		3.876		8.876
68.8	1.860		3.720		8.720
69.3	1.782		3.564		8.564
69.8	1.704		3.408		8.408
70.3	1.626		3.252		8.252
70.8	1.548		3.096		8.096
71.5	1.399		2.798		7.798
71.7	1.342		2.684		7.684

Nonaxisymmetric afterbody					
FS	R	HI	HT	WI	WT
61.3	1.000	3.000	5.000	8.000	10.000
62.3	.952	3.060	4.964	8.060	9.964
62.8	.919	3.084	4.922	8.084	9.922
63.3	.883	3.100	4.866	8.100	9.866
63.8	.843	3.108	4.794	8.108	9.794
64.3	.801	3.104	4.706	8.104	9.706
64.8	.757	3.088	4.602	8.088	9.602
65.3	.711	3.062	4.484	8.062	9.484
65.8	.664	3.022	4.350	8.022	9.350
66.3	.614	2.974	4.202	8.004	9.232

	Low-aspect-ratio nozzle					Medium-aspect-ratio nozzle				High-aspect-ratio nozzle			
FS	R	HI	HT	WI	WT	HI	HT	WI	WT	HI	HT	WI	WT
66.8	.563	2.926	4.052	7.892	9.018	2.912	4.038	7.932	9.058	2.886	4.012	7.980	9.106
67.3	.511	2.884	3.906	7.730	8.752	2.836	3.858	7.846	8.868	2.784	3.806	7.960	8.982
67.8	.457	2.840	3.754	7.544	8.458	2.750	3.664	7.750	8.664	2.668	3.582	7.952	8.866
68.3	.402	2.788	3.592	7.332	8.136	2.618	3.422	7.618	8.422	2.538	3.342	7.940	8.744
68.8	.346	2.726	3.418	7.094	7.786	2.542	3.234	7.542	8.234	2.398	3.090	7.924	8.616
69.3	.289	2.652	3.230	6.840	7.418	2.418	2.996	7.418	7.996	2.244	2.822	7.908	8.486
69.8	.231	2.564	3.026	6.566	7.028	2.284	2.746	7.284	7.746	2.084	2.546	7.888	8.350
70.3	.171	2.464	2.806	6.278	6.620	2.140	2.482	7.140	7.482	1.920	2.262	7.870	8.212
70.8	.111	2.346	2.568	5.972	6.194	1.986	2.208	6.986	7.208	1.750	1.972	7.846	8.068
71.5	.024	2.158	2.206	5.522	5.570	1.758	1.806	6.758	6.806	1.516	1.564	7.810	7.858
71.7	0.0	2.098	2.098	5.390	5.390	1.690	1.690	6.690	6.690	1.450	1.450	7.798	7.798

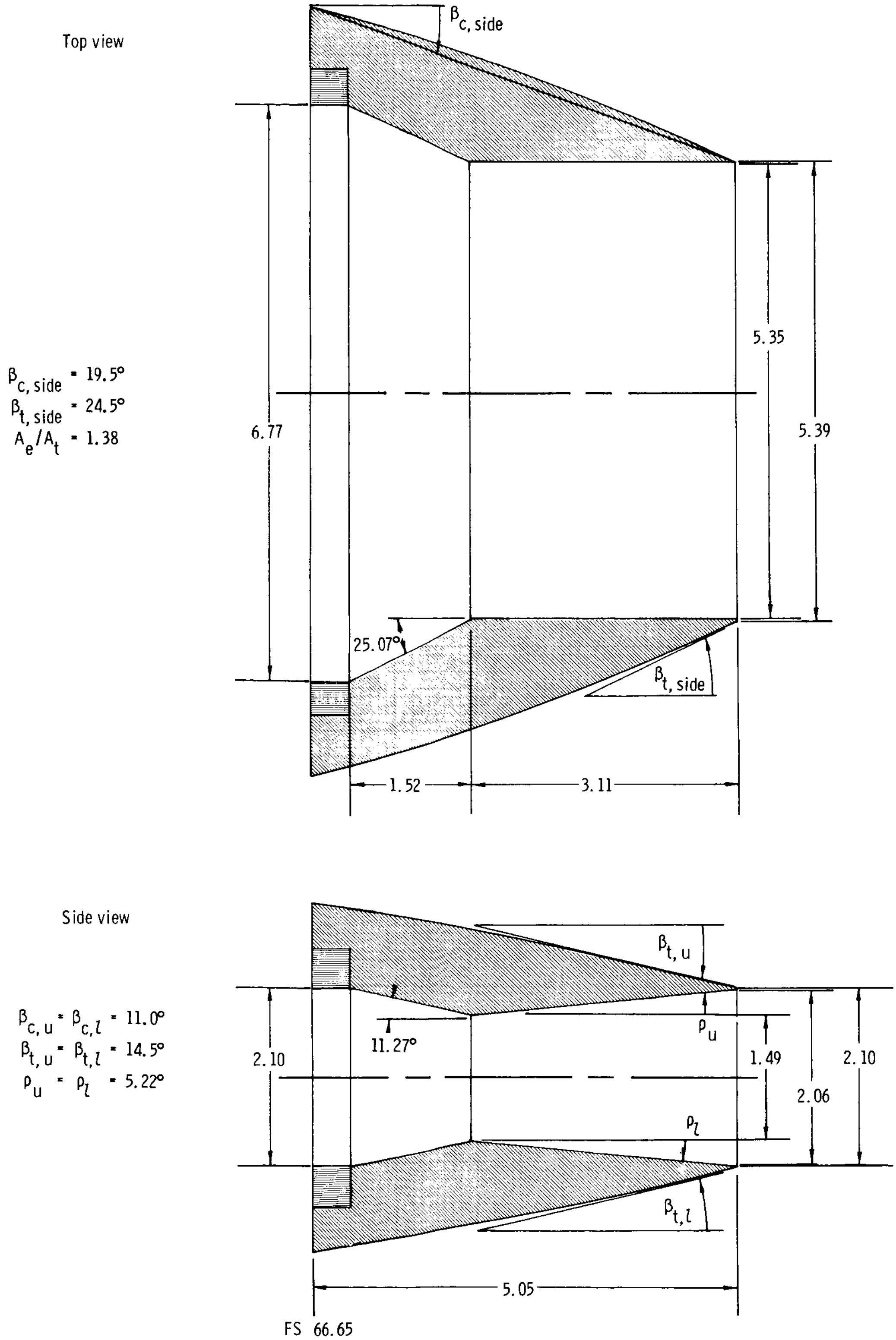
(a) External coordinates.

Figure 3. External geometry. Symbols used are defined in above sketch. All dimensions are given in inches.



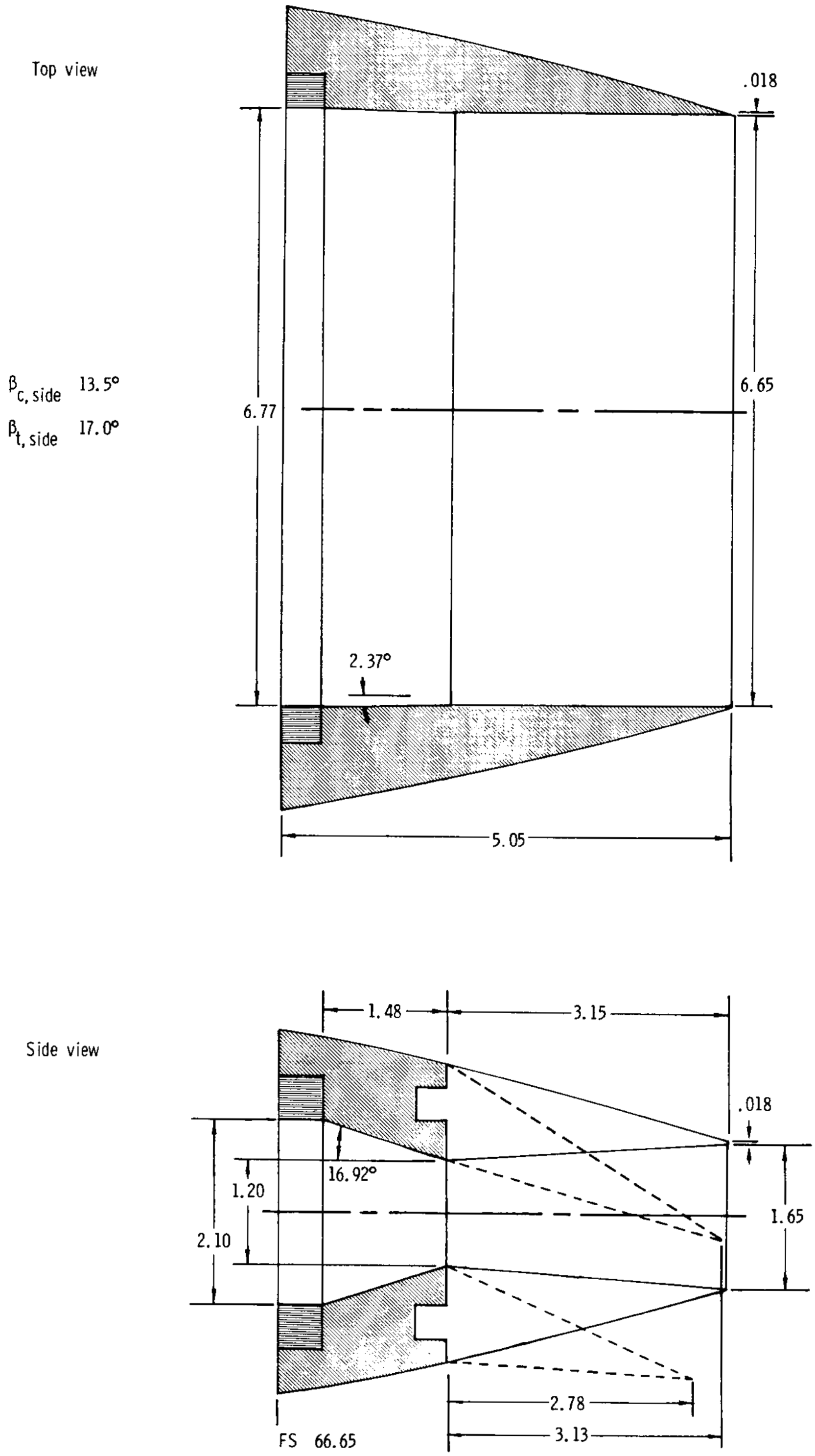
(b) Aft-end cross-sectional area distribution.

Figure 3. Concluded.



(a) Low-aspect-ratio nozzle.

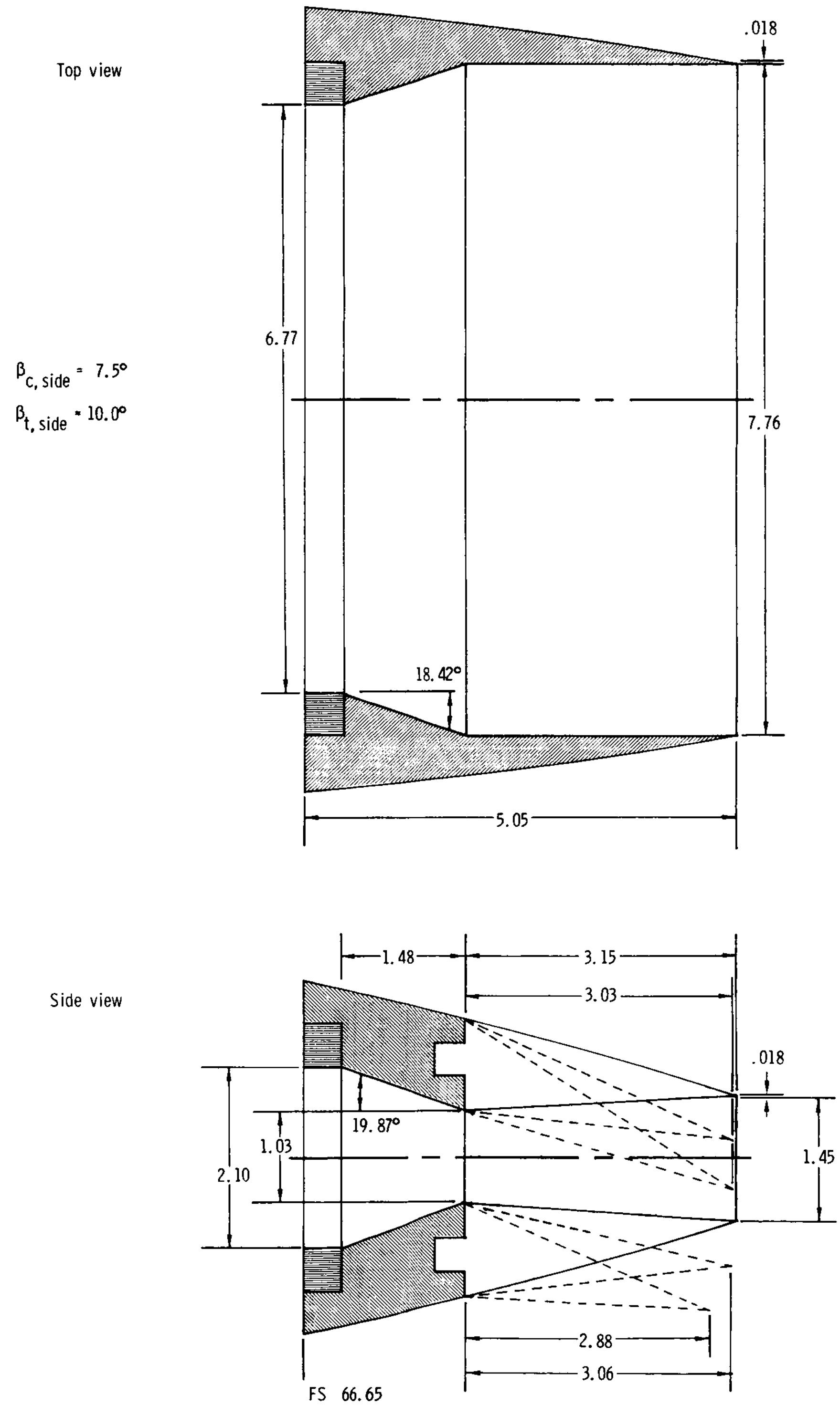
Figure 4. Nozzle internal geometry. All dimensions are given in inches unless otherwise specified.



δ_v(deg)	$\beta_{c,u}$(deg)	$\beta_{c,l}$(deg)	$\beta_{t,u}$(deg)	$\beta_{t,l}$(deg)	ρ_u(deg)	ρ_l(deg)	A_e / A_t
0	13.5	13.5	14.5	14.5	4.12	4.12	1.38
20	24.9	2.4	33.5	-6.5	-15.88	24.12	1.26

(b) Medium-aspect-ratio nozzle.

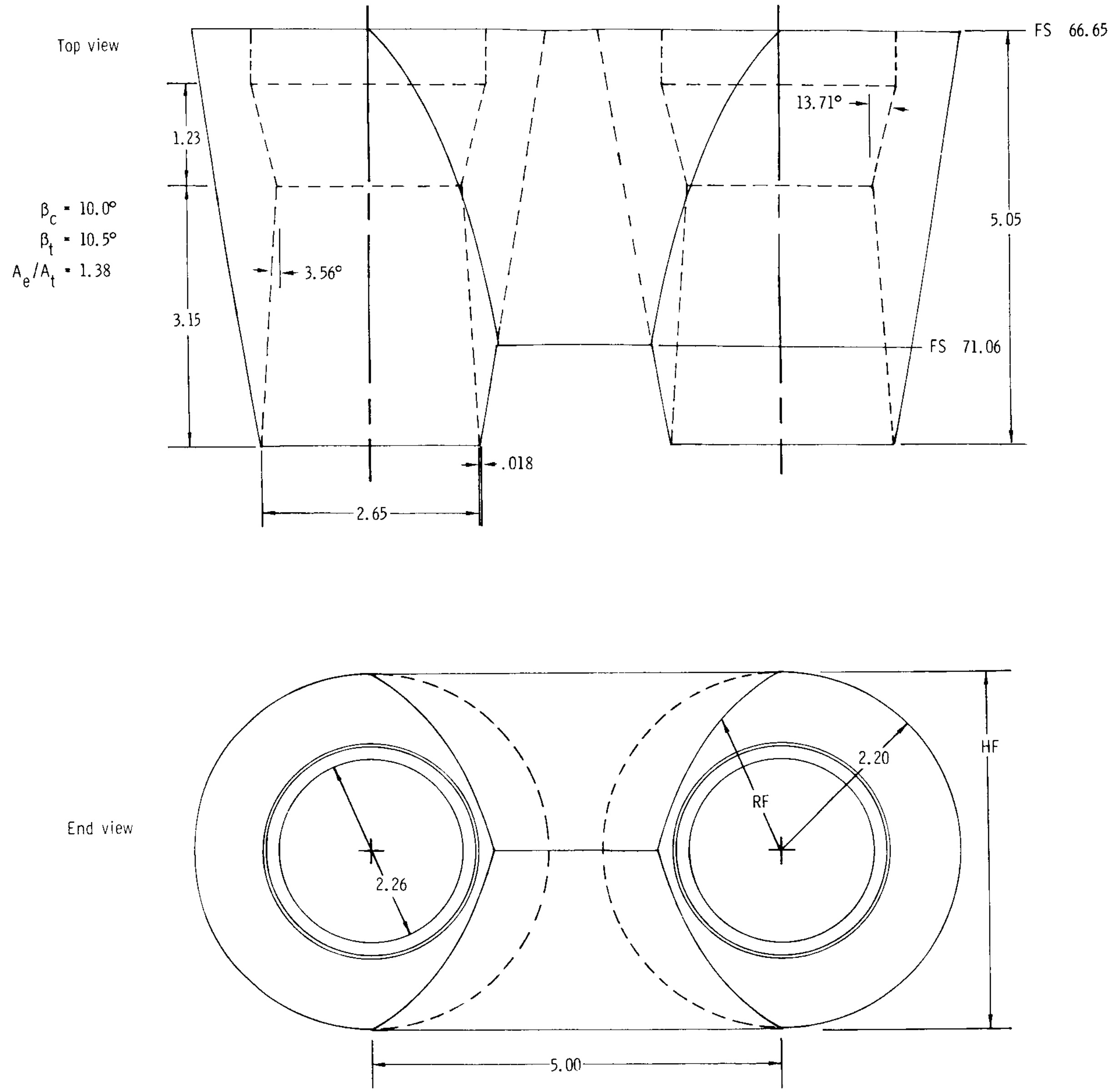
Figure 4. Continued.



δ_v(deg)	$\beta_{c,u}$(deg)	$\beta_{c,l}$(deg)	$\beta_{t,u}$(deg)	$\beta_{t,l}$(deg)	ρ_u(deg)	ρ_l(deg)	A_e / A_t
0	15.0	15.0	17.5	17.5	3.81	3.81	1.41
10	20.6	8.9	27.5	7.5	-6.19	13.81	1.36
20	26.0	3.0	37.5	-2.5	-16.19	23.81	1.36

(c) High-aspect-ratio nozzle.

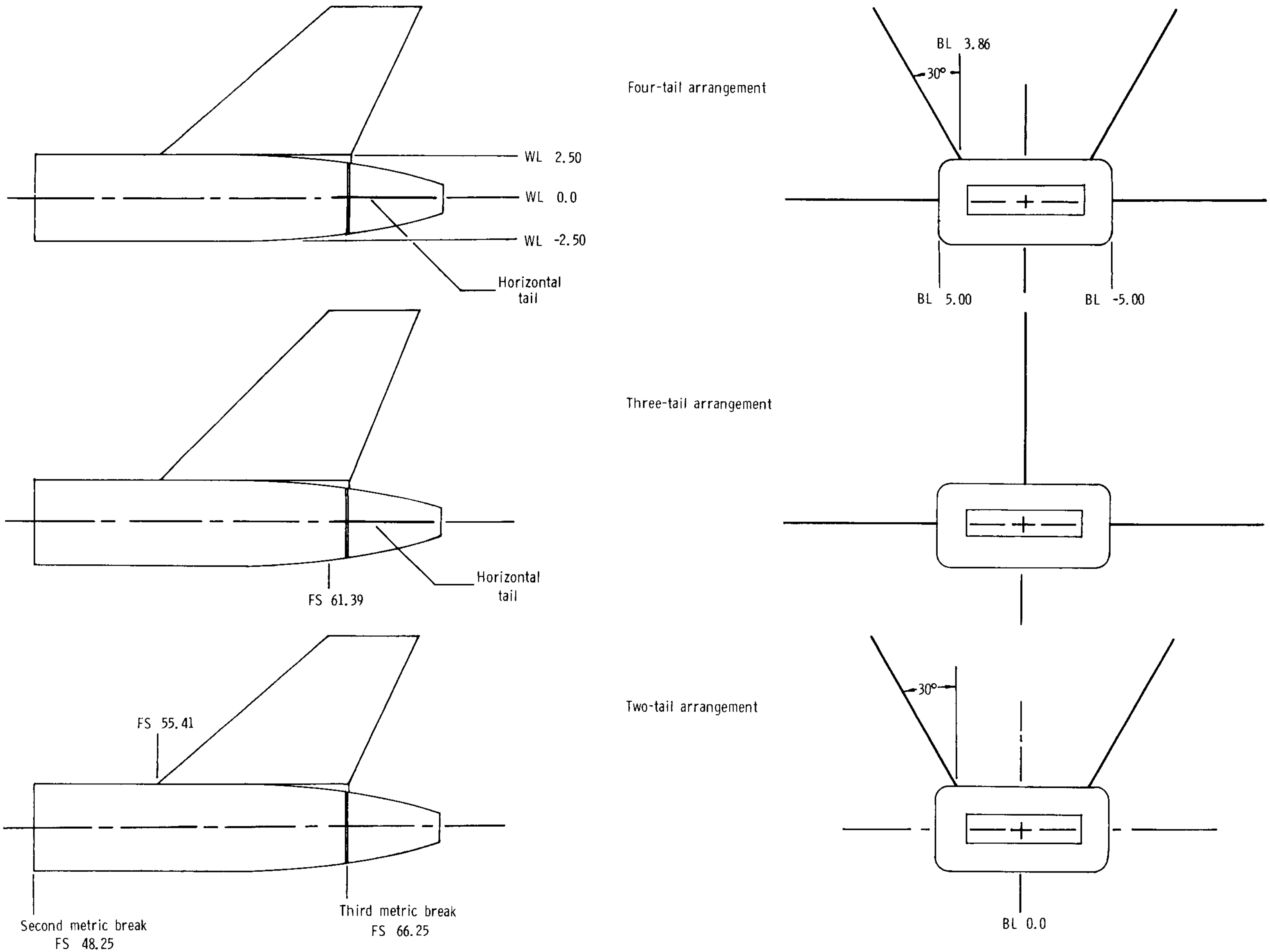
Figure 4. Continued.



Nozzle interfairing		
FS	RF	HF
66.65	2.195	4.390
66.80	2.172	4.344
67.30	2.094	4.160
67.80	2.016	3.854
68.30	1.938	3.467
68.80	1.860	3.017
69.30	1.782	2.496
69.80	1.704	1.900
70.30	1.626	1.220
70.80	1.548	0.444
71.06	1.501	0.0

(d) Twin axisymmetric nozzles. RF and and HF are defined in sketch.

Figure 4. Concluded.

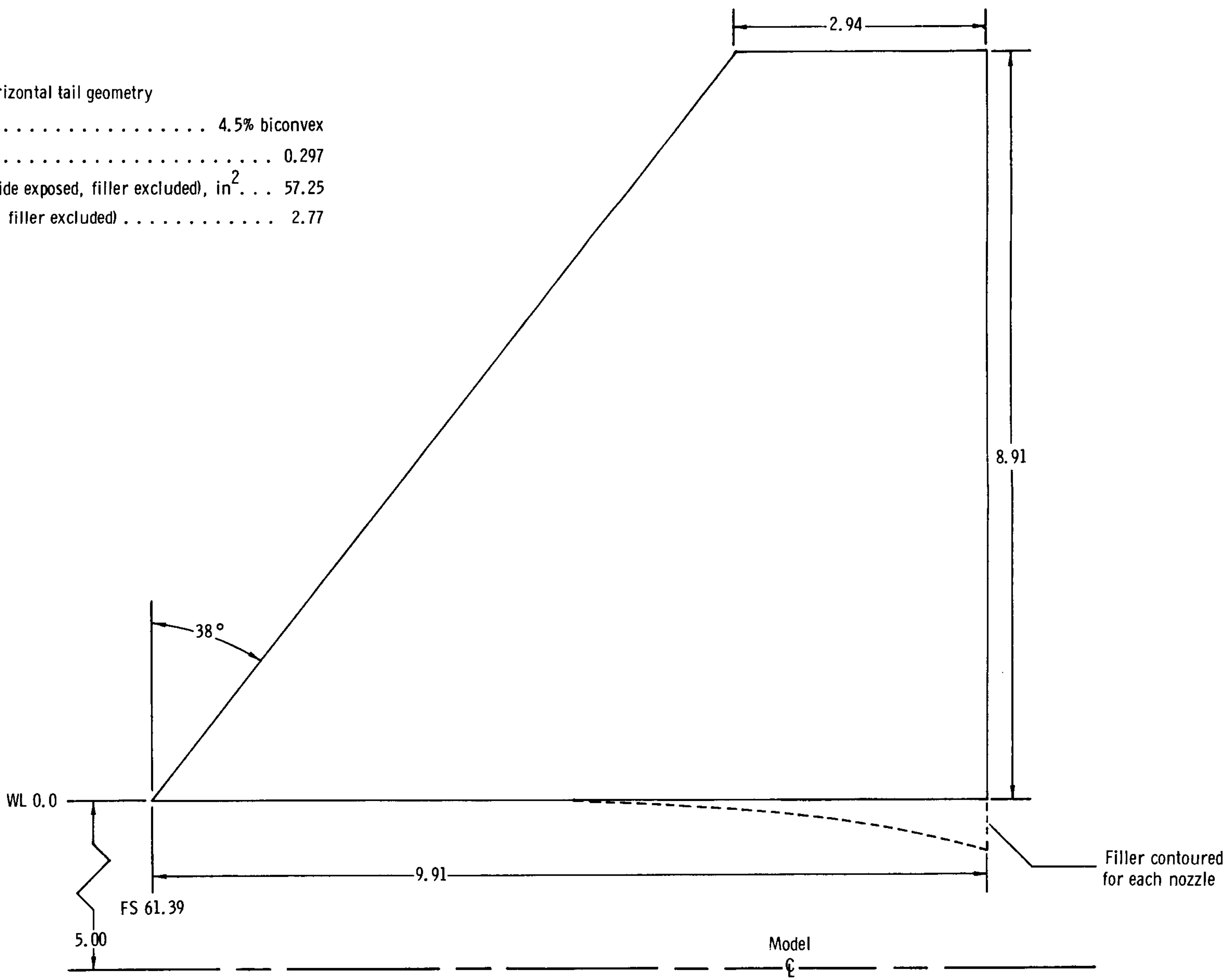


(a) Empennage arrangements.

Figure 5. Empennage geometry. All dimensions are given in inches unless otherwise specified.

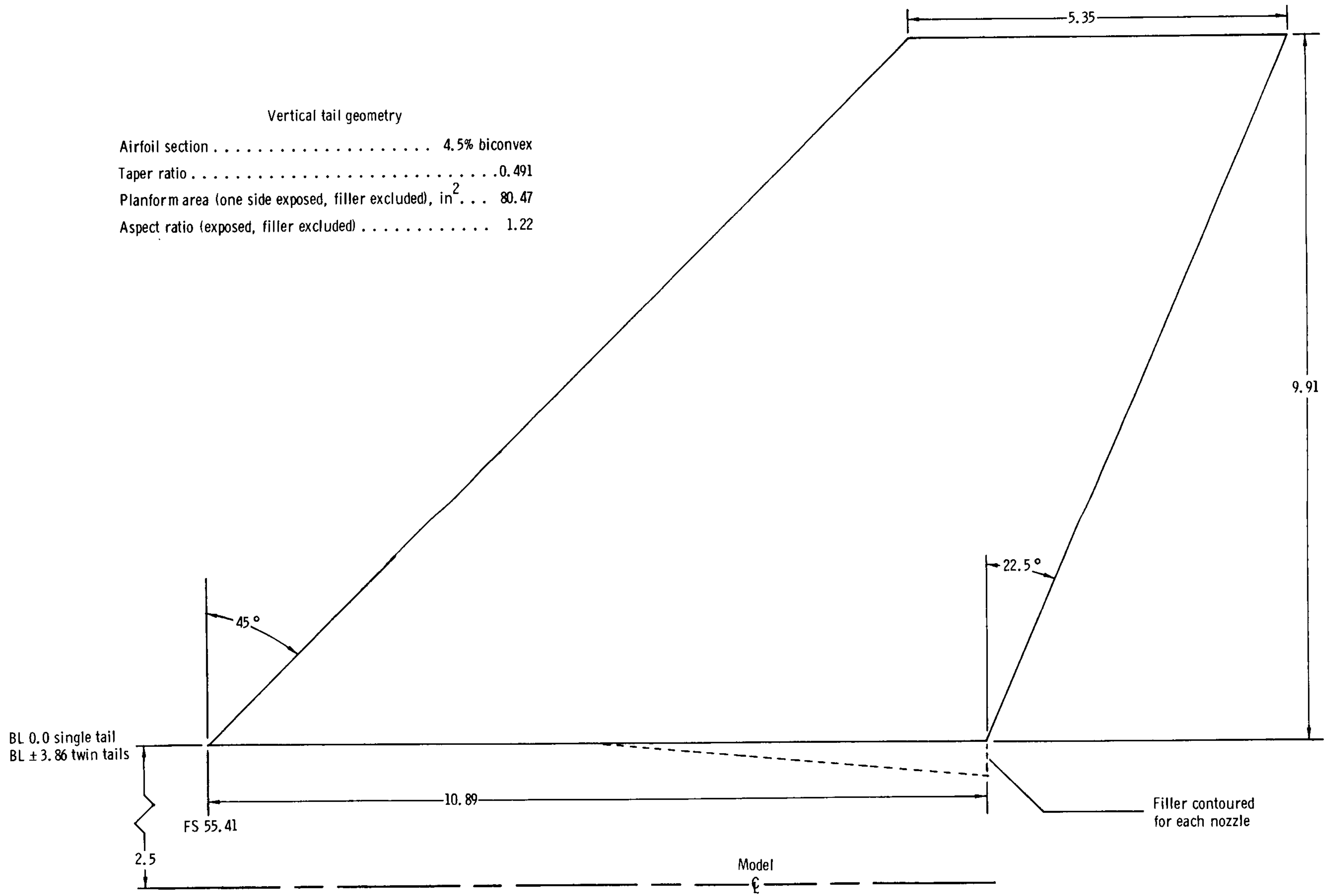
Horizontal tail geometry

Airfoil section	4.5% biconvex
Taper ratio	0.297
Planform area (one side exposed, filler excluded), in^2	57.25
Aspect ratio (exposed, filler excluded)	2.77



(b) Horizontal tail geometry.

Figure 5. Continued.



(c) Vertical tail geometry.

Figure 5. Concluded.

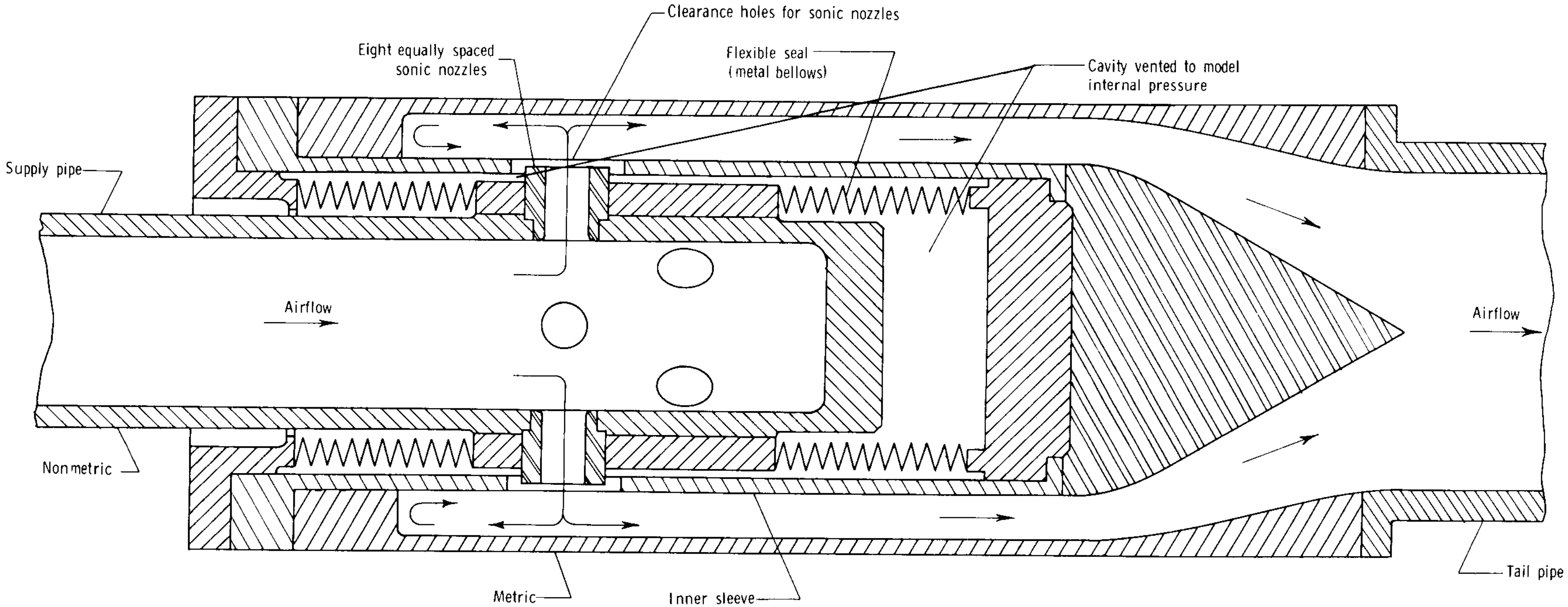
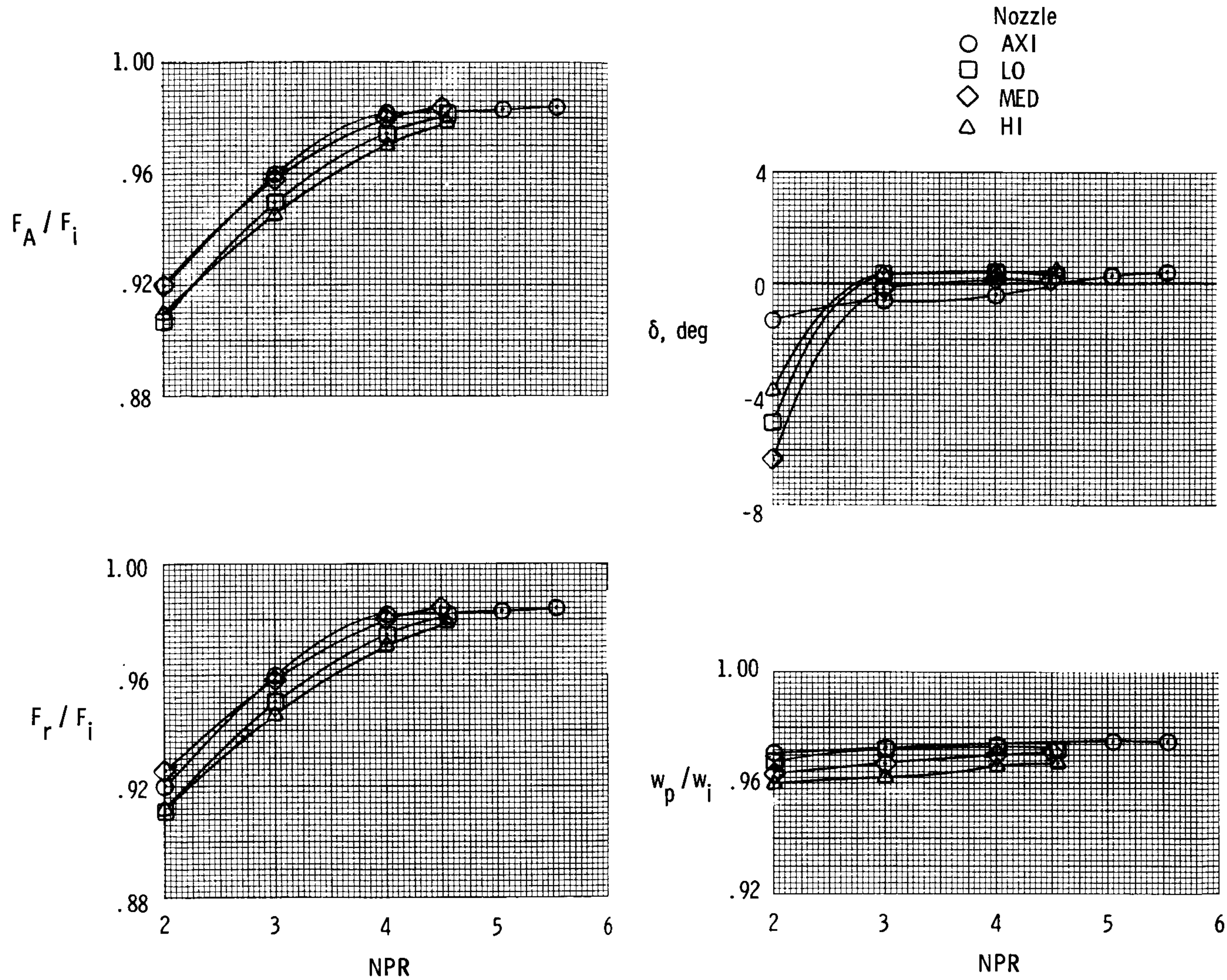
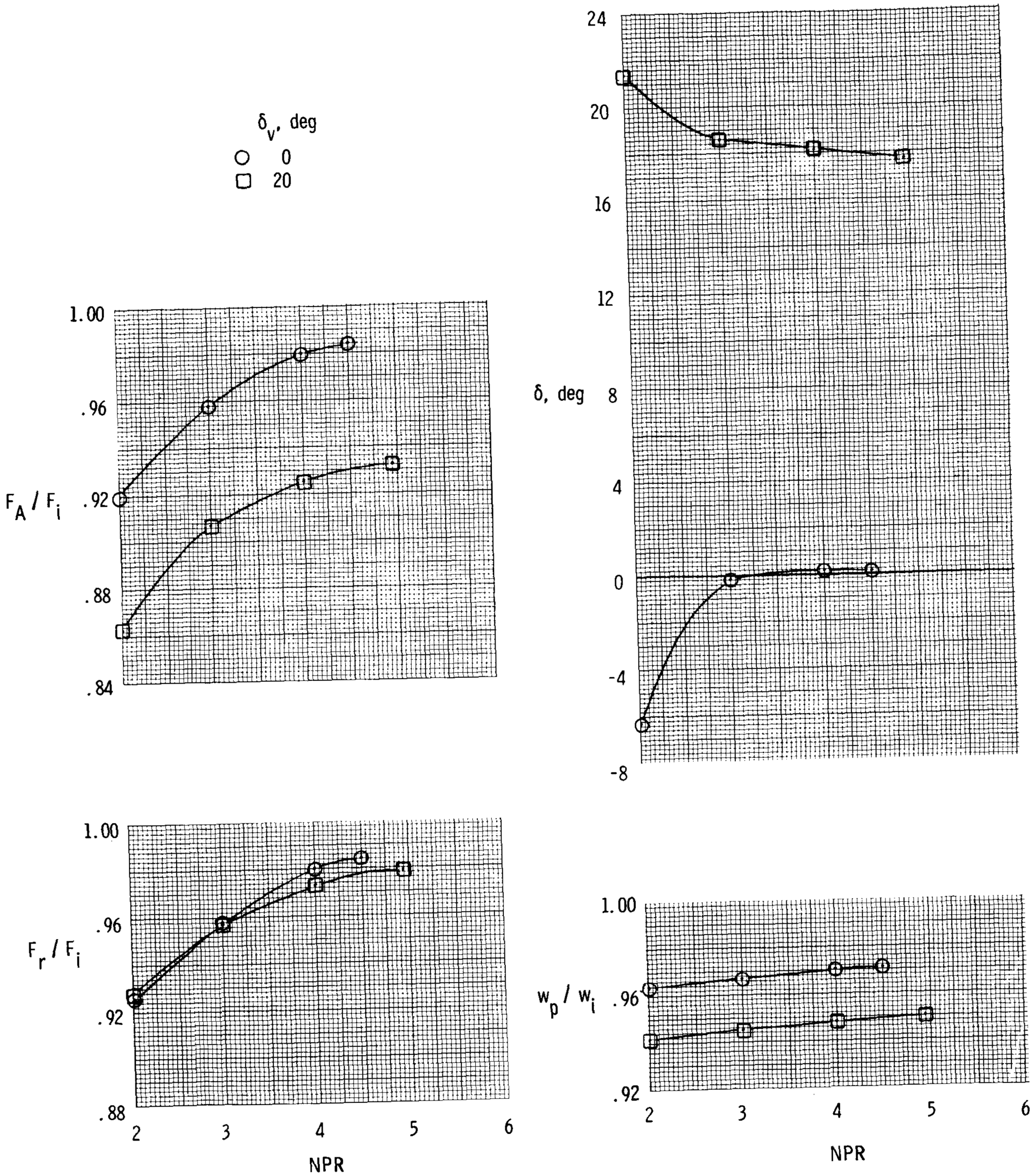


Figure 6. Details of bellows arrangement used to transfer air from nonmetric to metric portions of model.



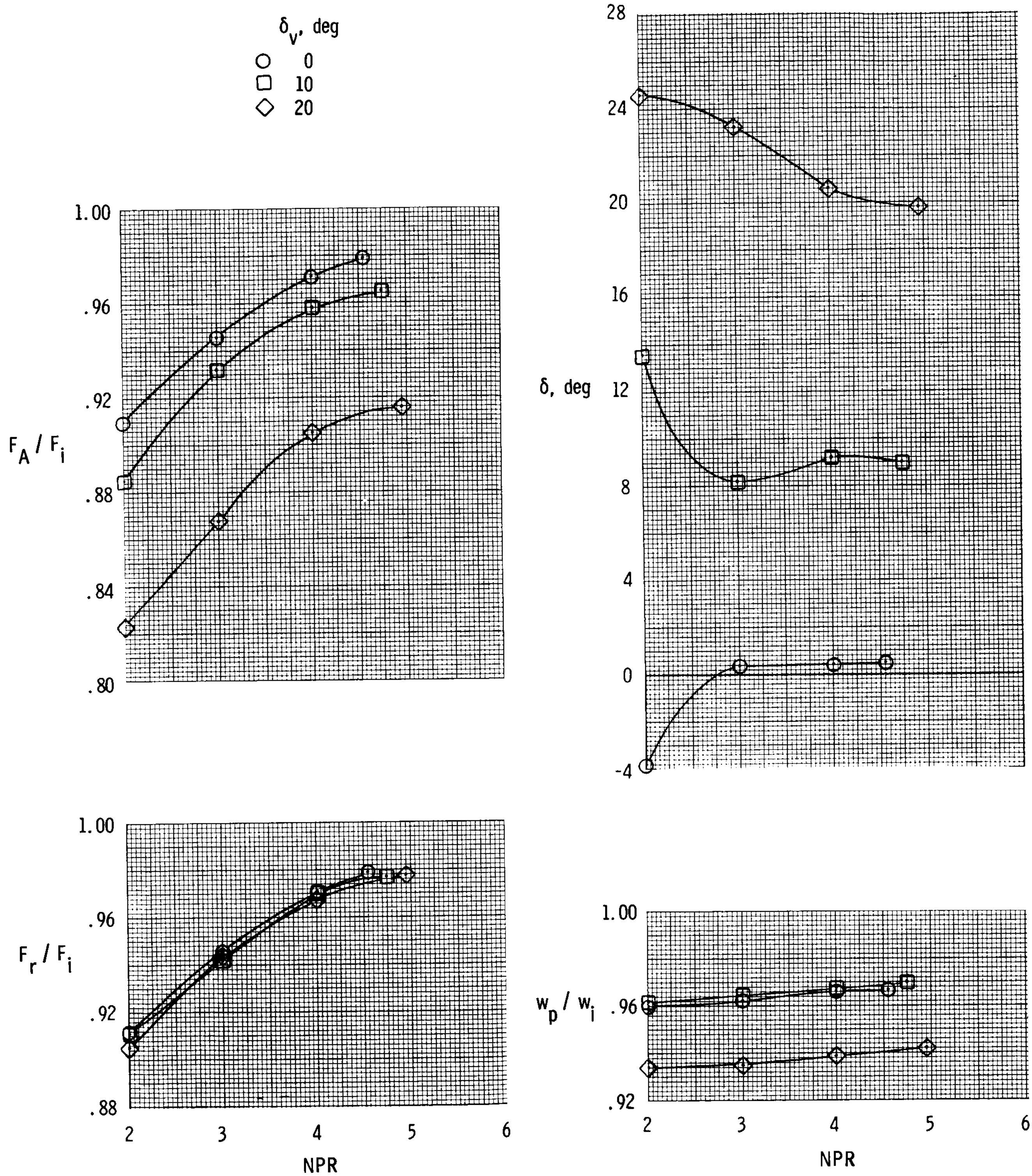
(a) Effect of nozzle configuration with $\delta_v = 0°$.

Figure 7. Nozzle static internal performance.



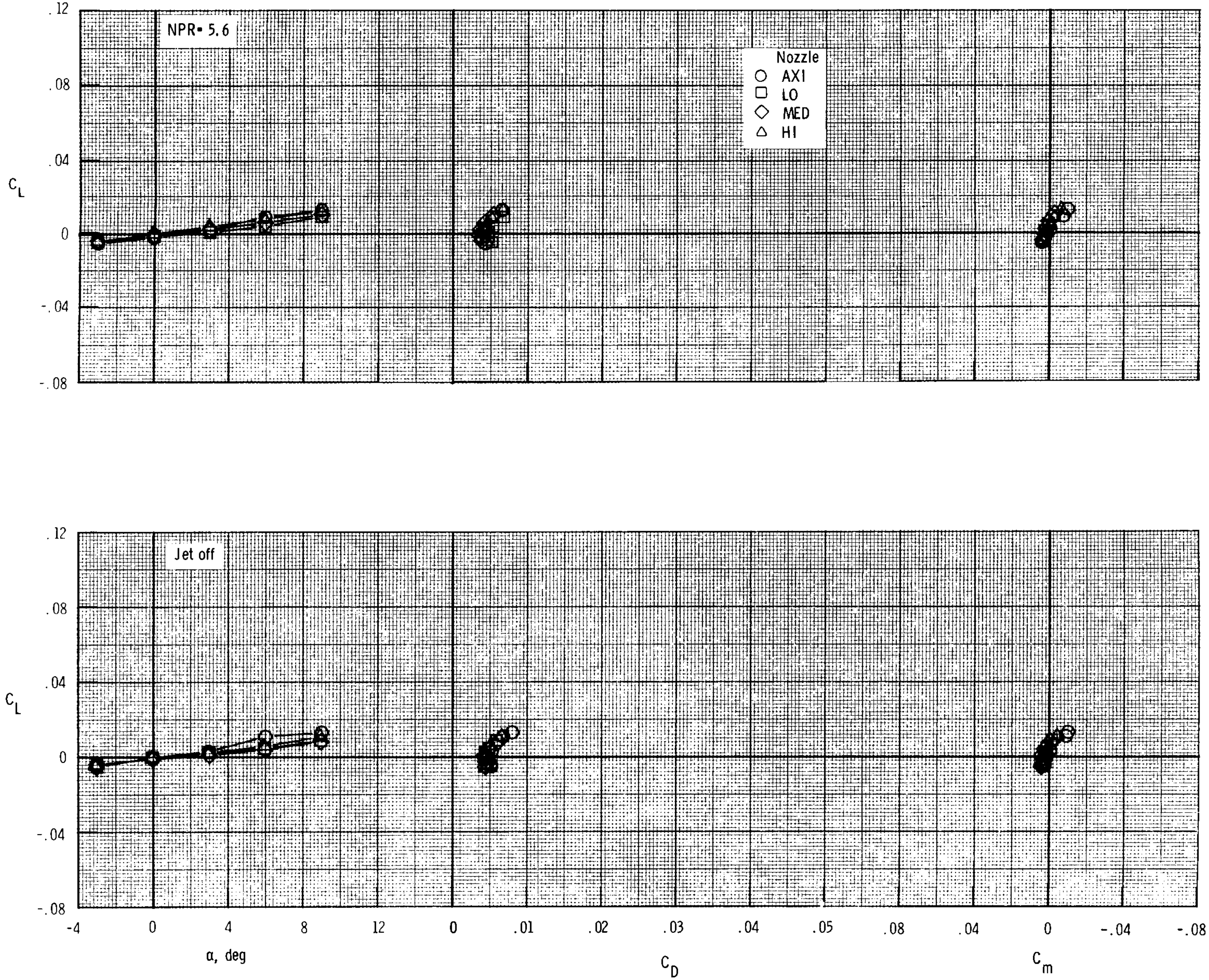
(b) Effect of design thrust vector angle for medium-aspect-ratio nozzle.

Figure 7. Continued.



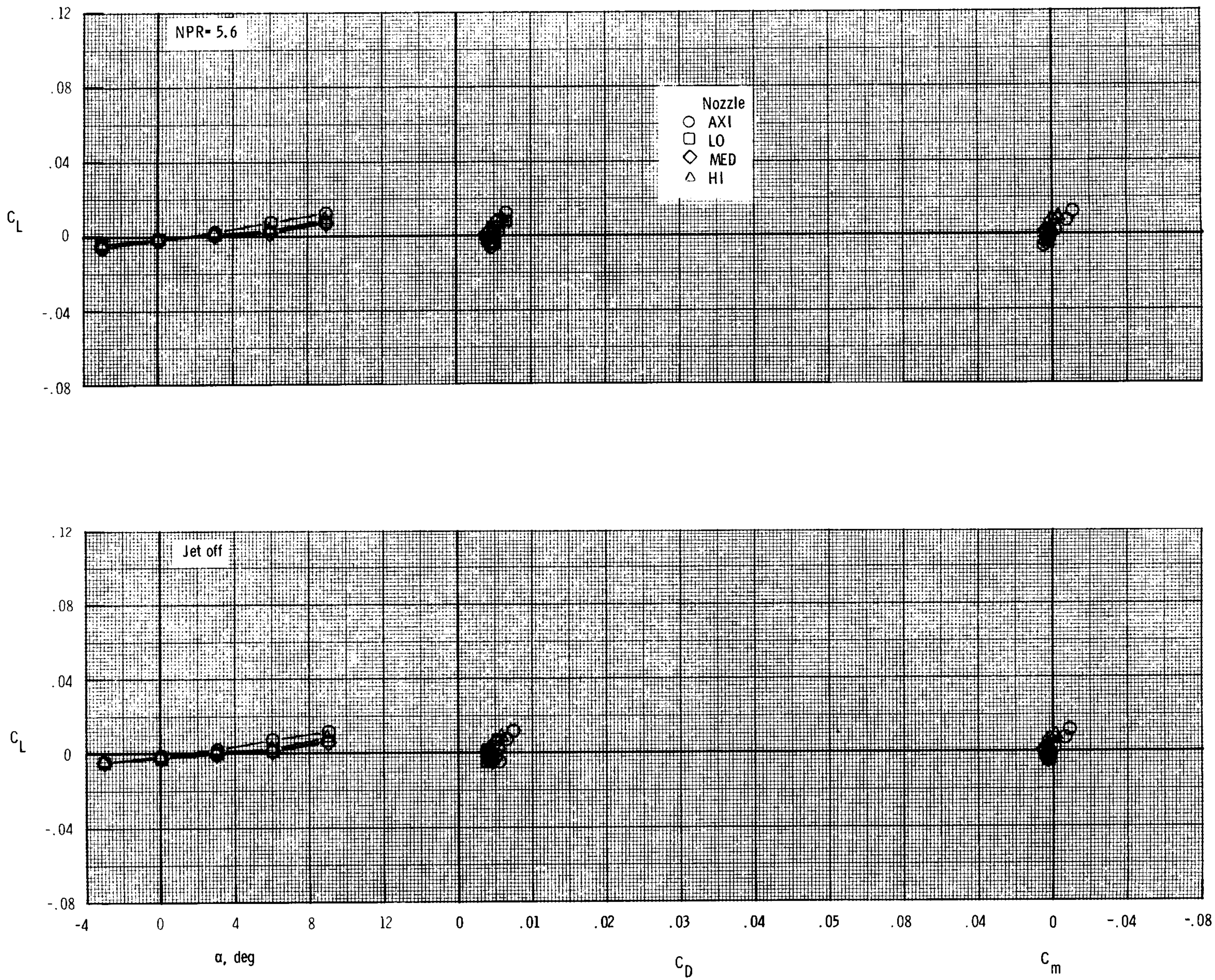
(c) Effect of design thrust vector angle for high-aspect-ratio nozzle.

Figure 7. Concluded.



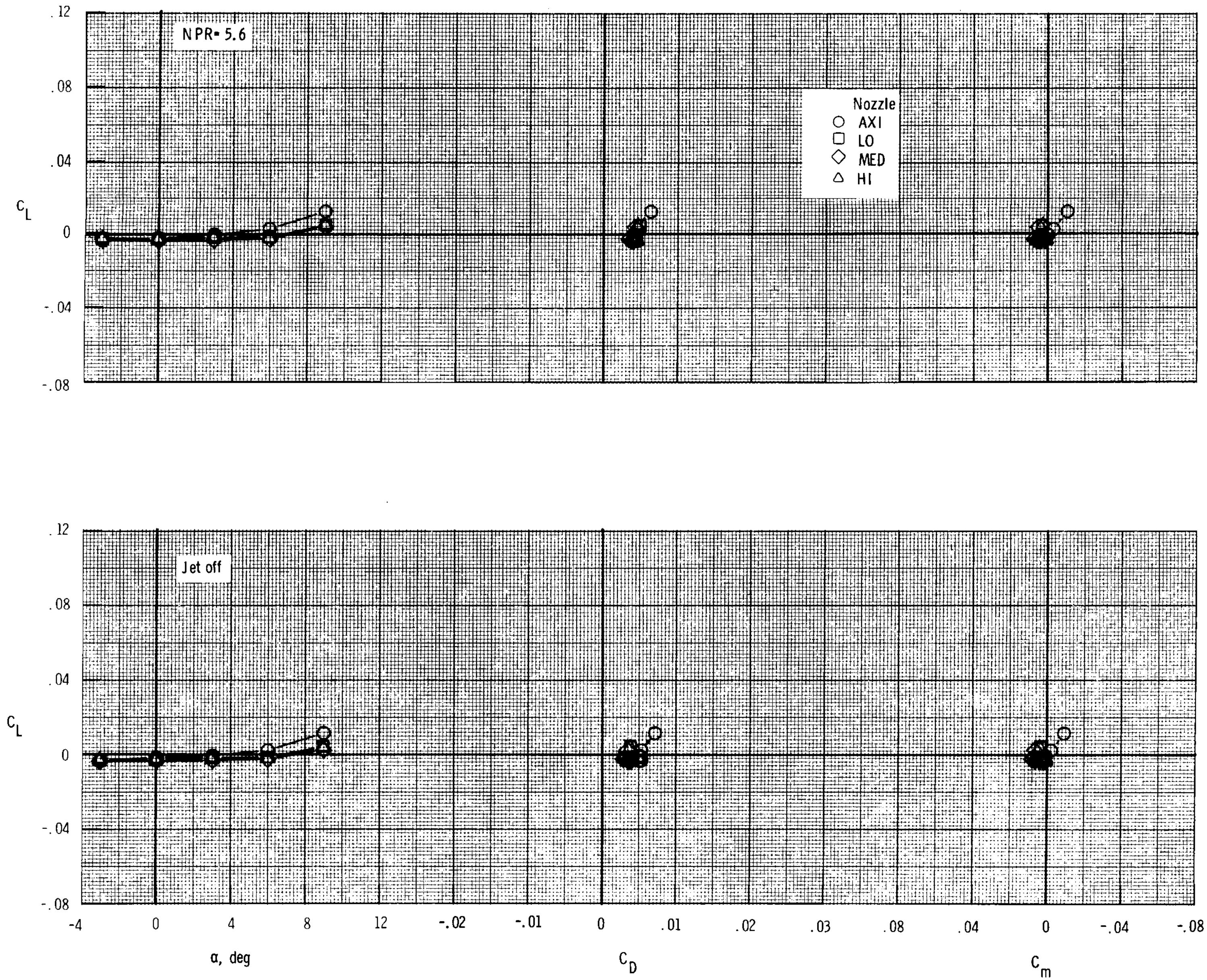
(a) $M = 0.60$.

Figure 8. Effect of nozzle configuration on aft-end aerodynamic characteristics with tails off and $\delta_v = 0°$.



(b) $M = 0.80$.

Figure 8. Continued.



(c) $M = 0.90$.

Figure 8. Continued.

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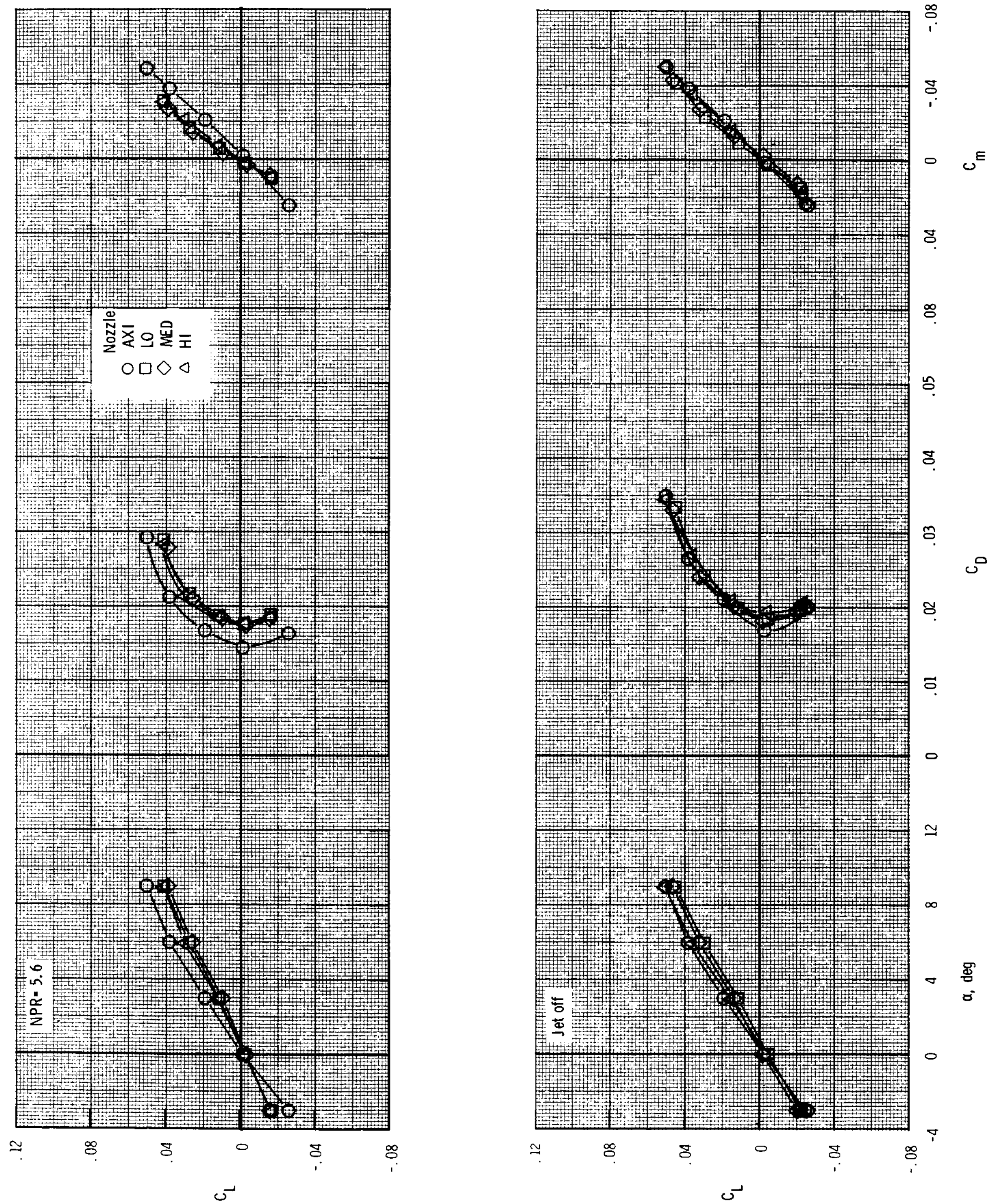
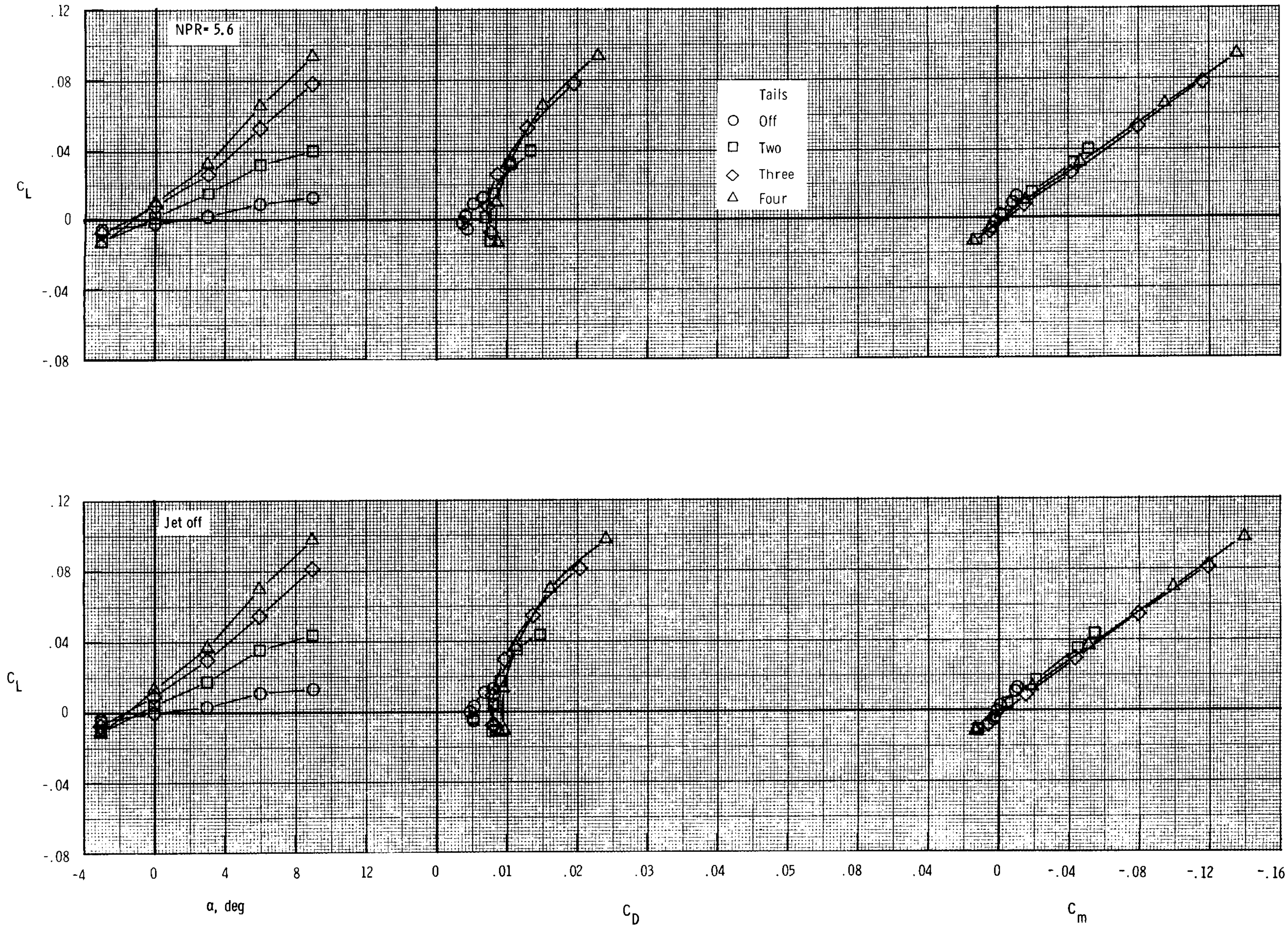


(d) $M = 1.20$.

Figure 8. Concluded.



(a) $M = 0.60$.

Figure 9. Effect of tail configuration on aft-end aerodynamic characteristics for twin axisymmetric nozzles.

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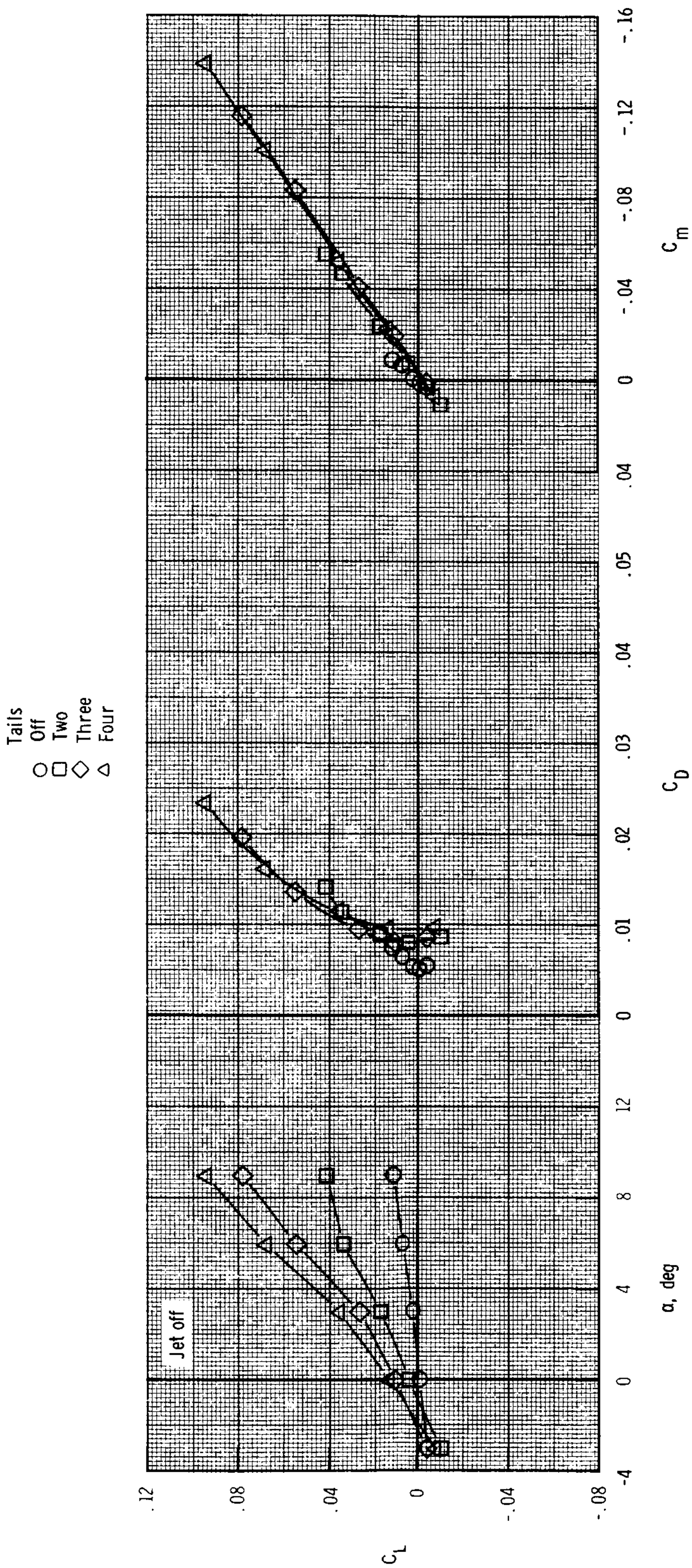
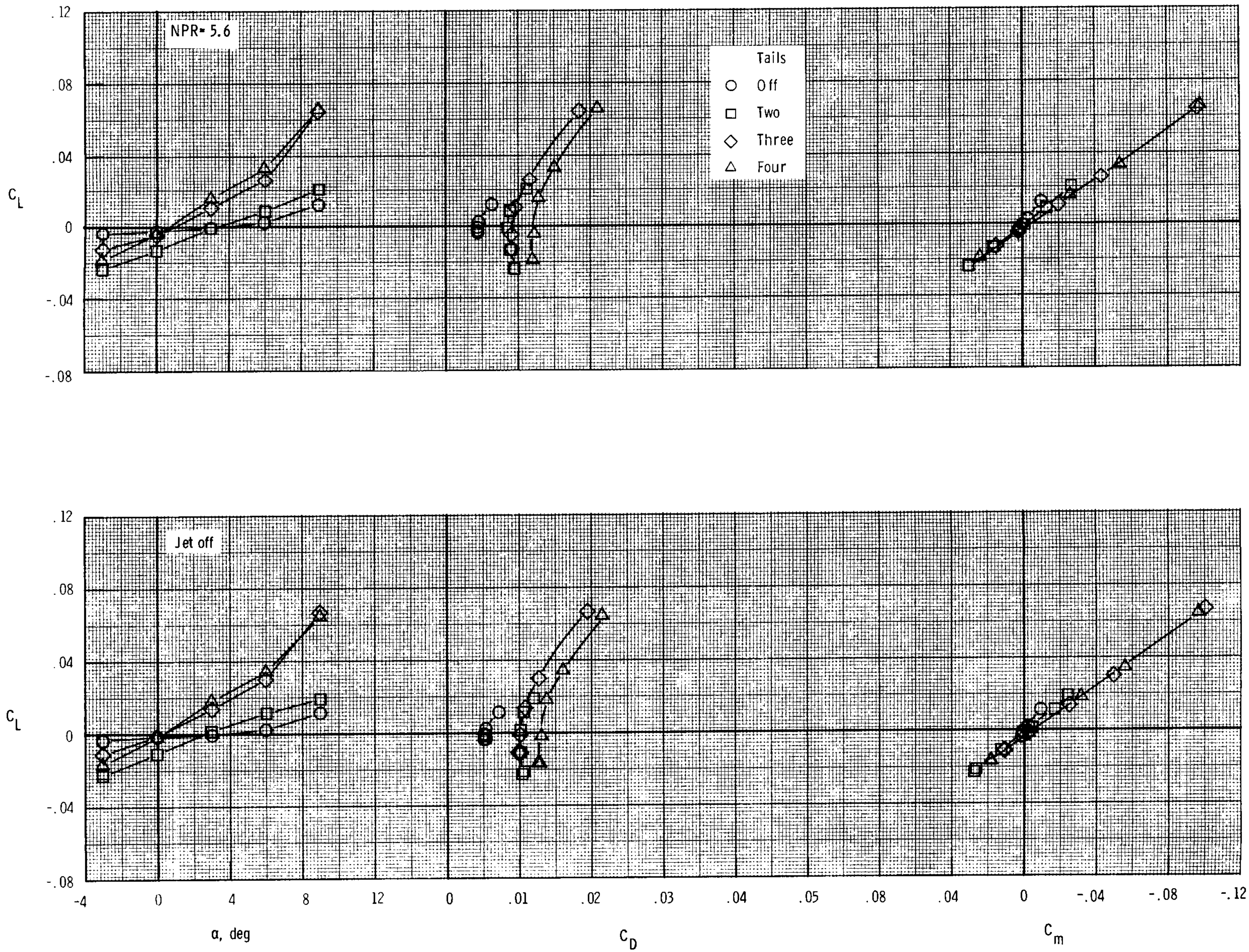


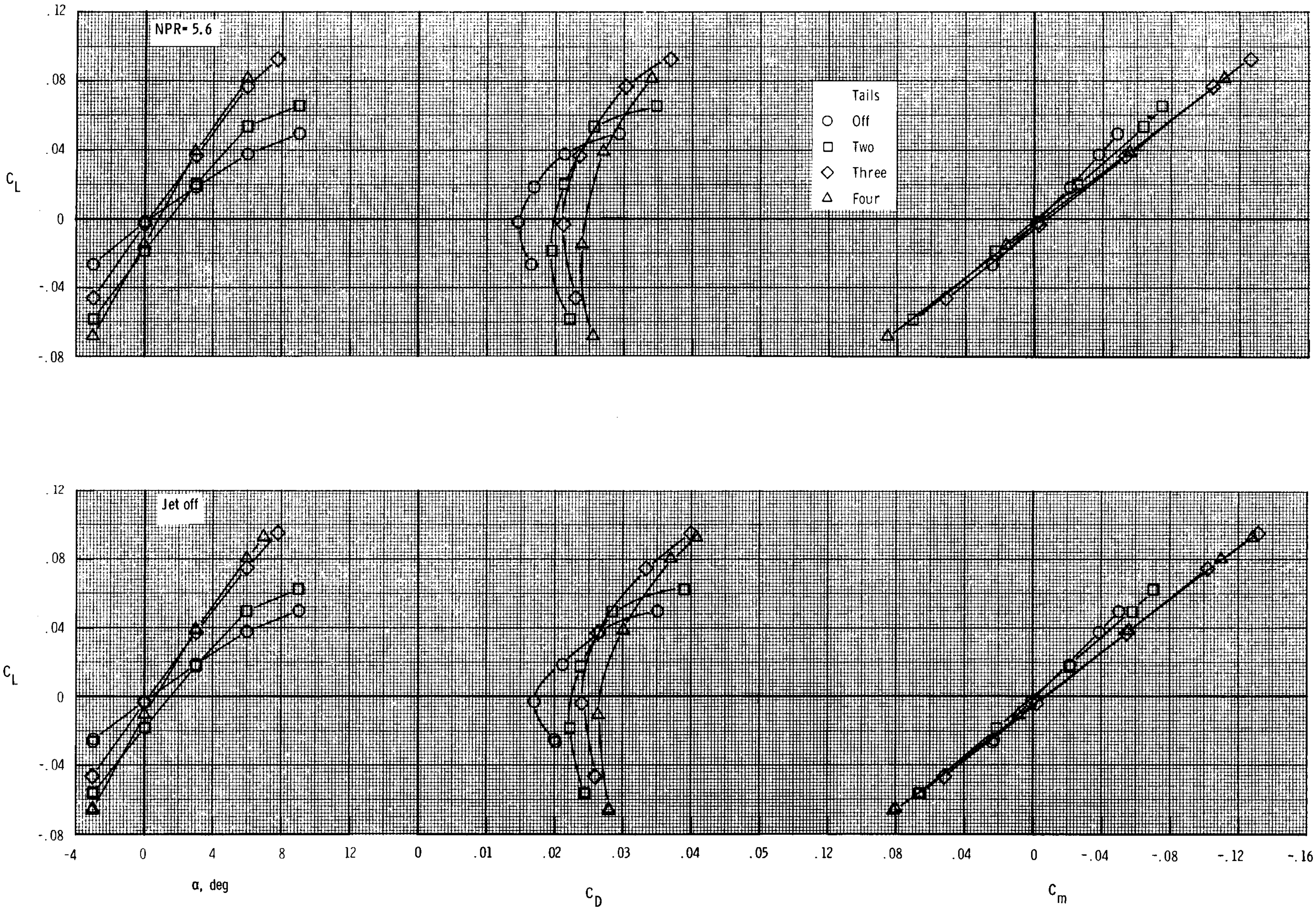
(b) $M = 0.80$.

Figure 9. Continued.



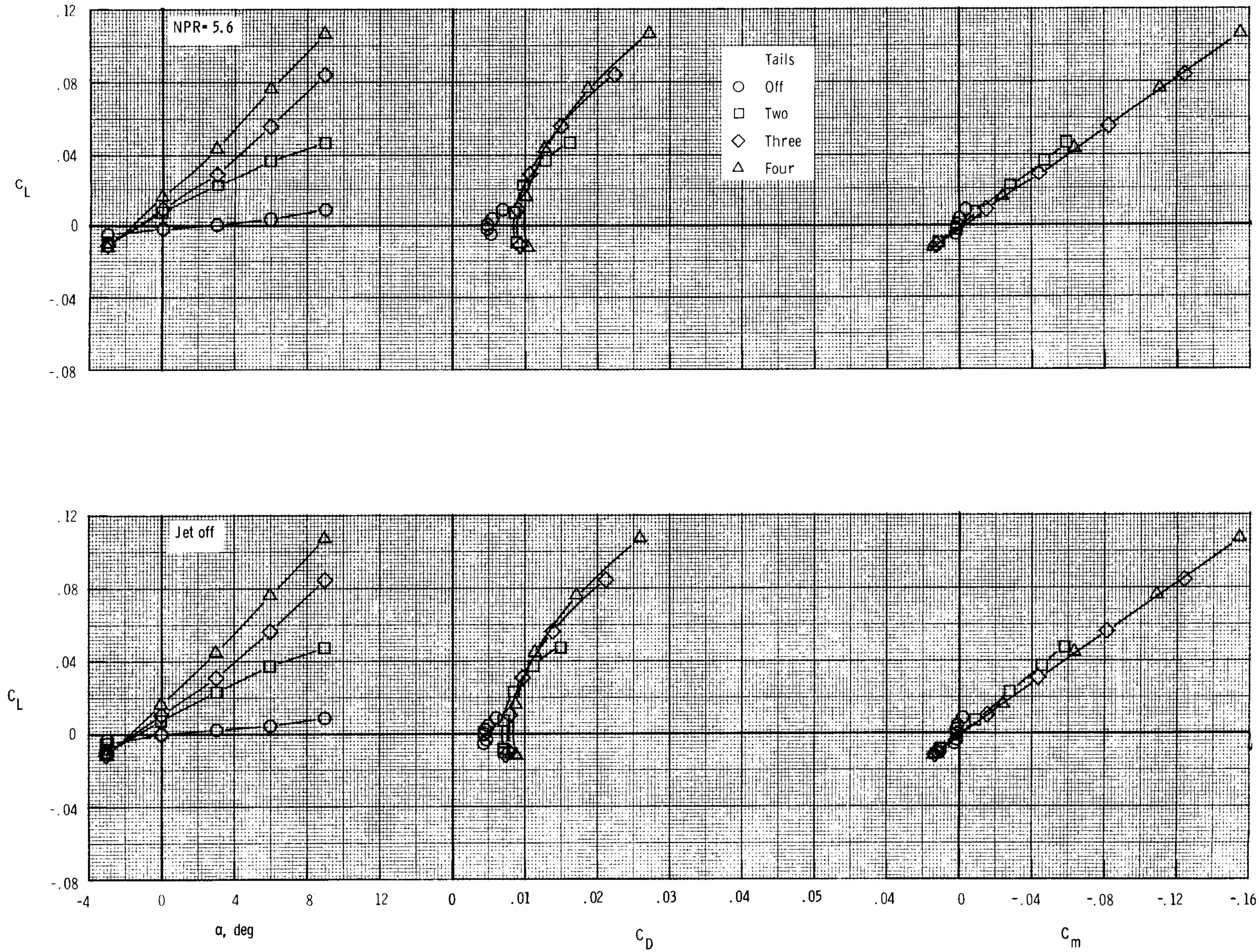
(c) $M = 0.90$.

Figure 9. Continued.



(d) $M = 1.20$.

Figure 9. Concluded.



(a) $M = 0.60$.

Figure 10. Effect of tail configuration on aft-end aerodynamic characteristics for low-aspect-ratio nozzle.

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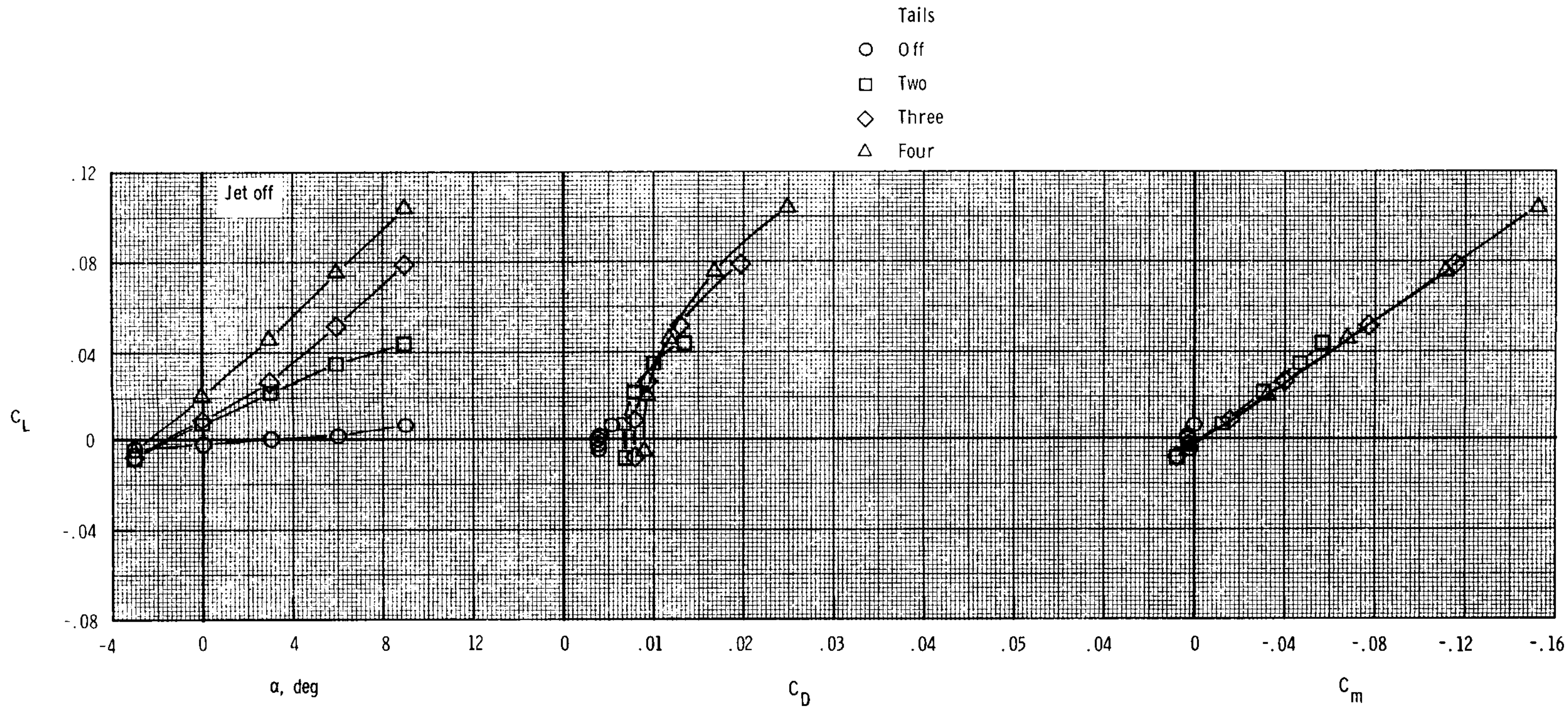
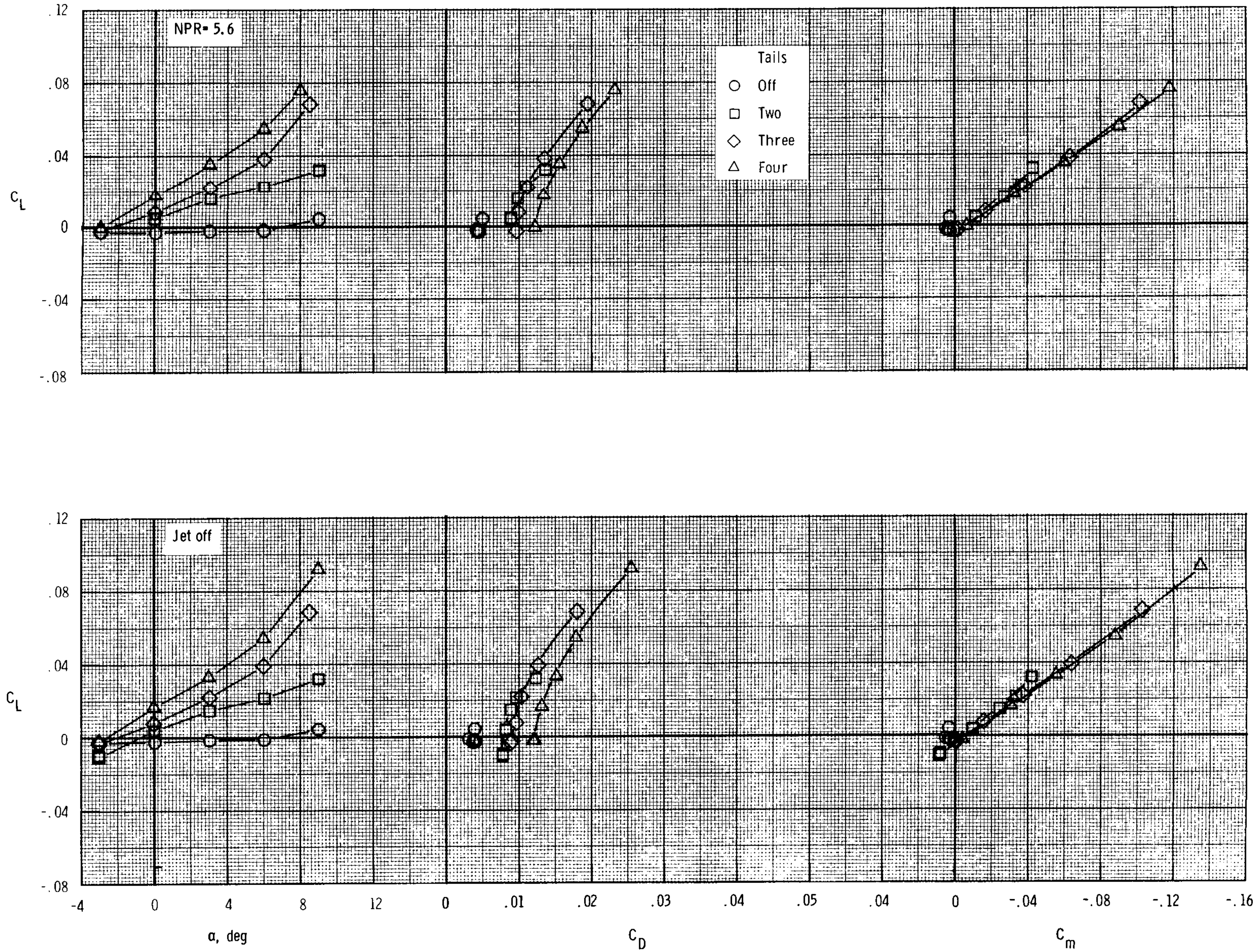


(b) $M = 0.80$.

Figure 10. Continued.



(c) $M = 0.90$.

Figure 10. Continued.

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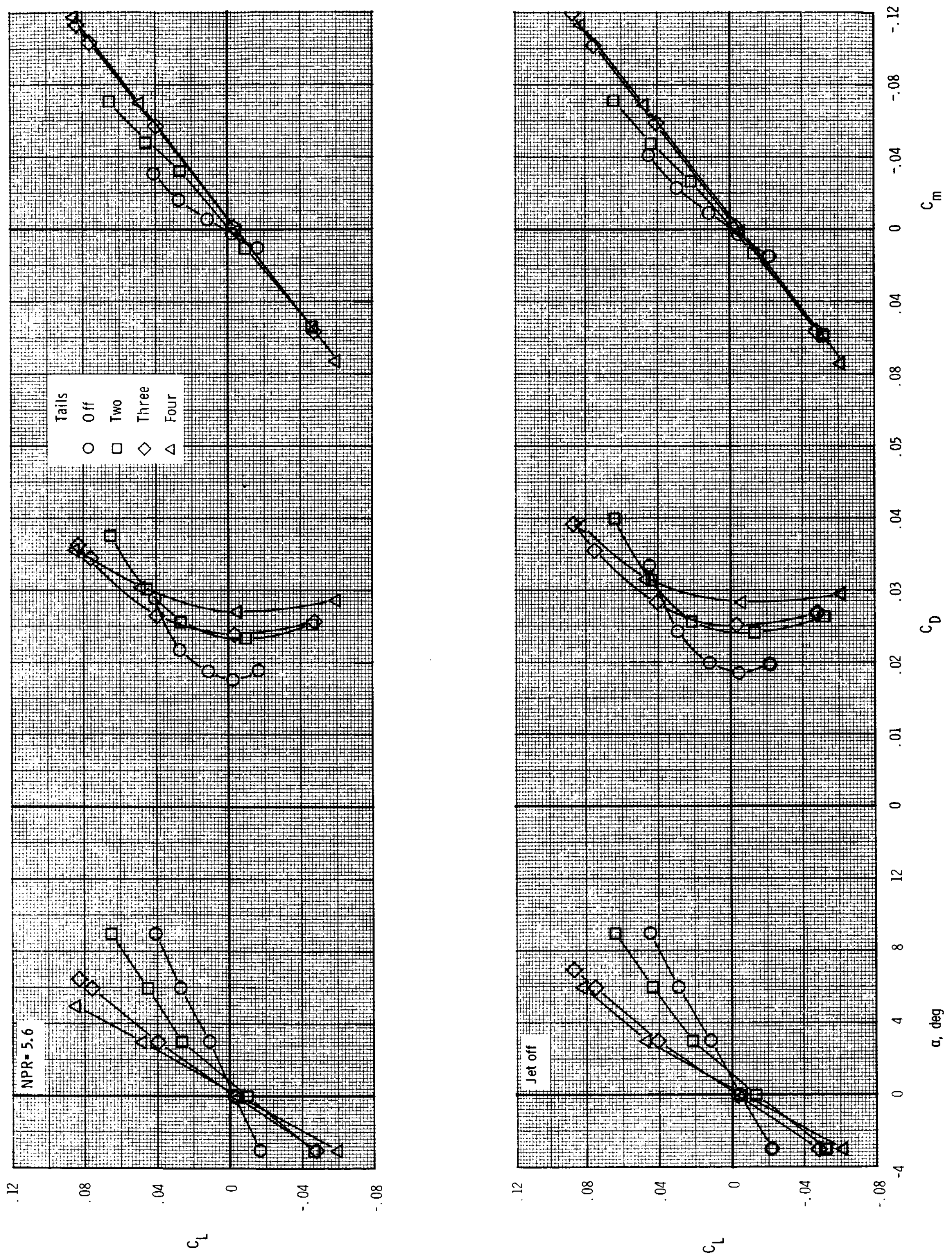
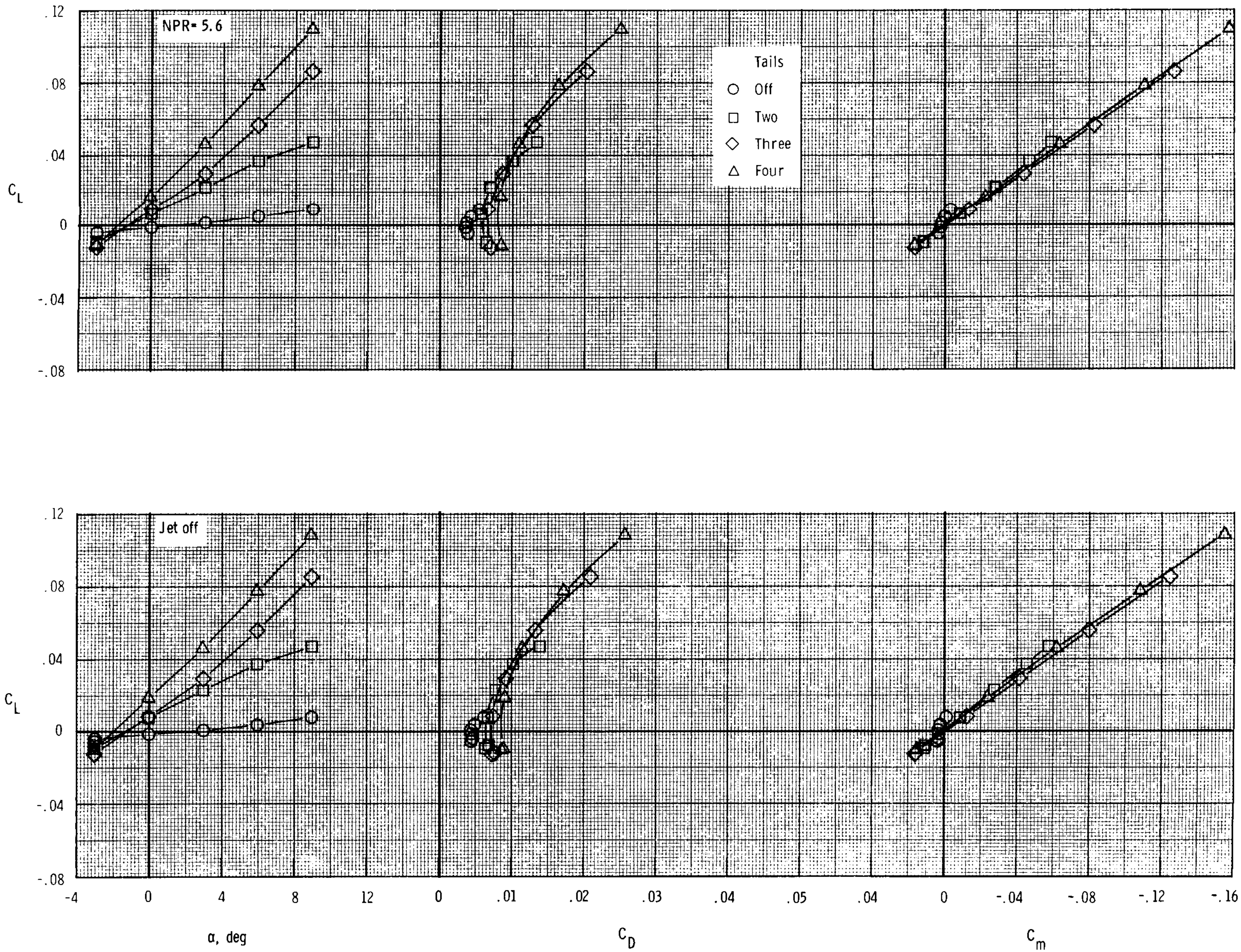


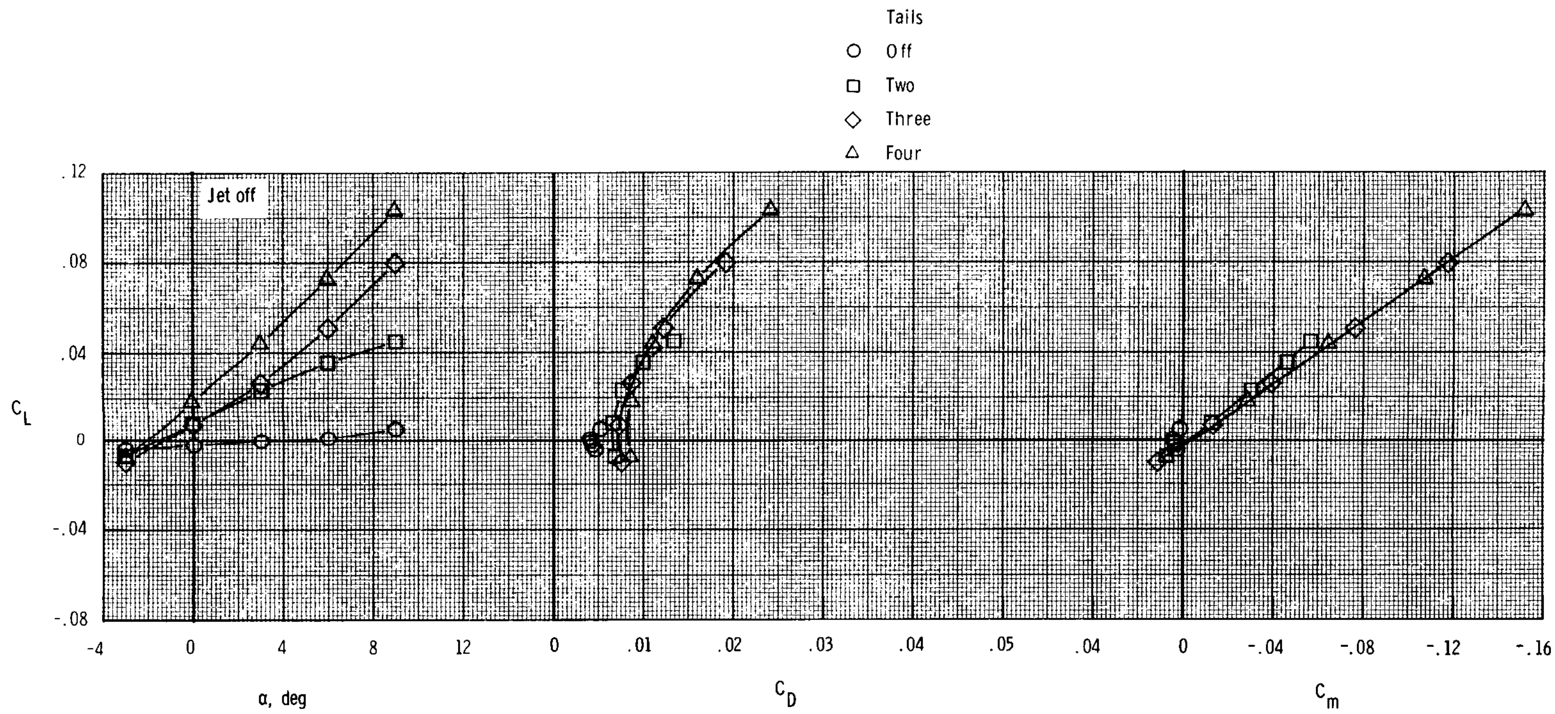
(d) $M = 1.20$.

Figure 10. Concluded.



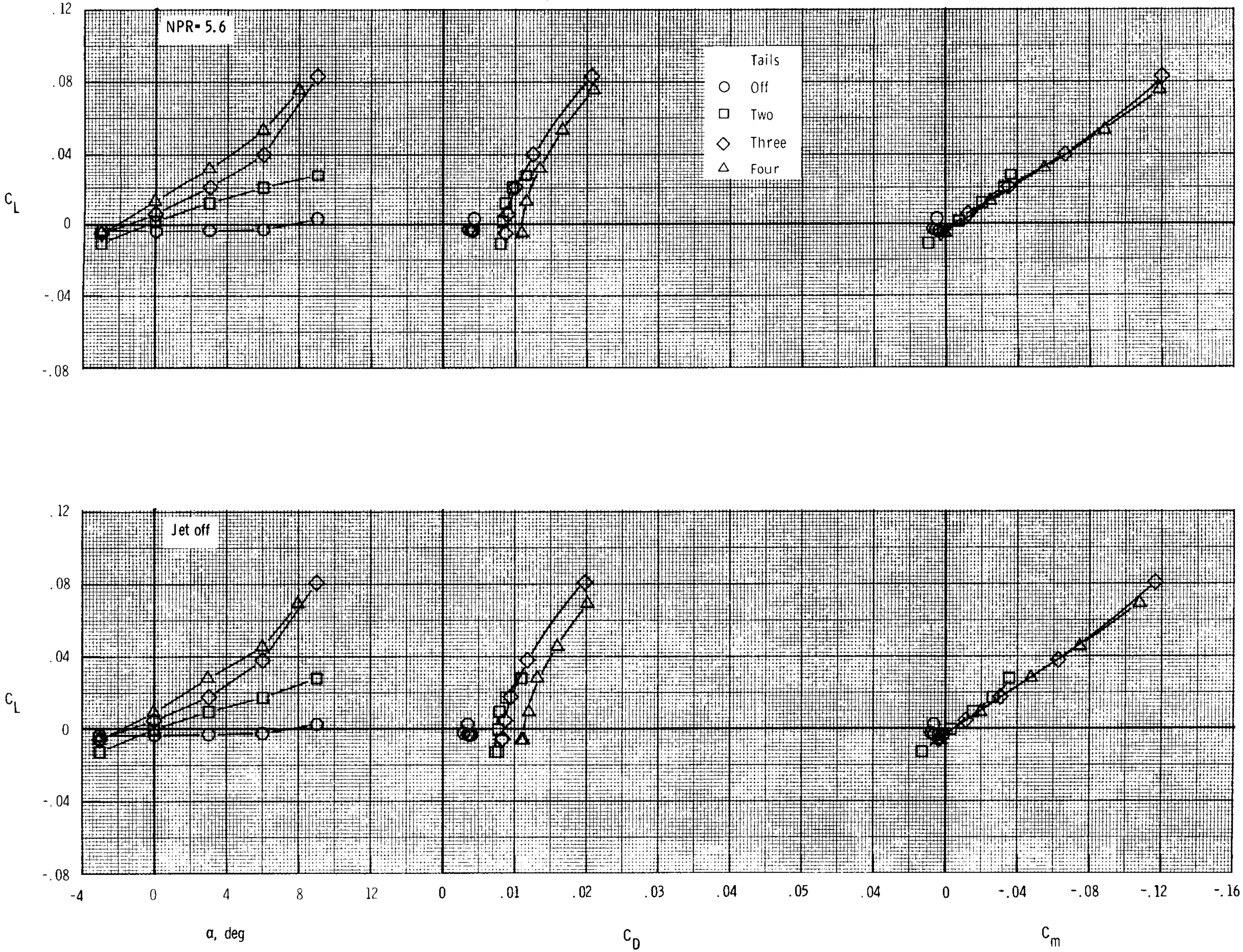
(a) $M = 0.60$.

Figure 11. Effect of tail configuration on aft-end aerodynamic characteristics for medium-aspect-ratio nozzle with $\delta_v = 0°$



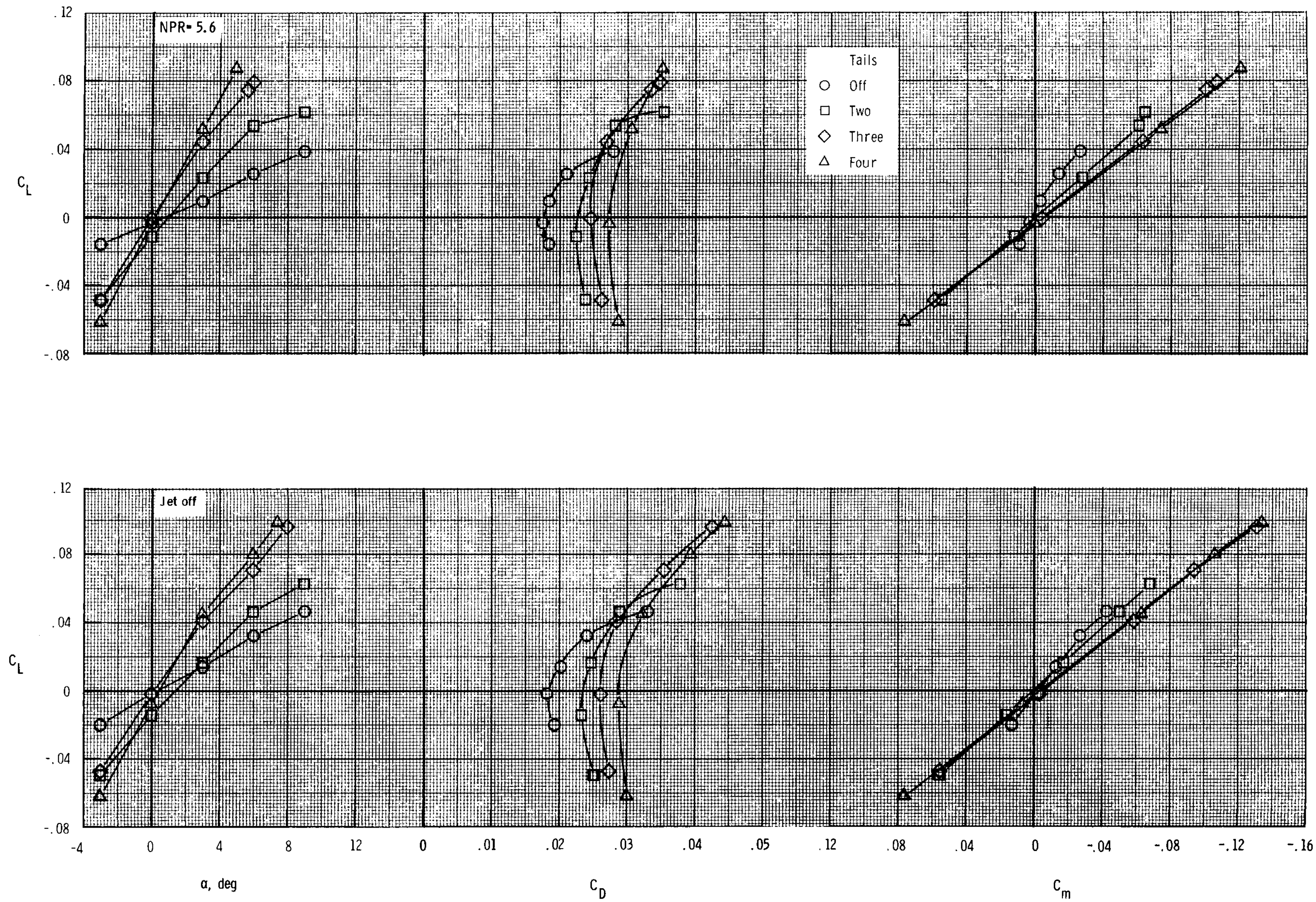
(b) $M = 0.80$.

Figure 11. Continued.



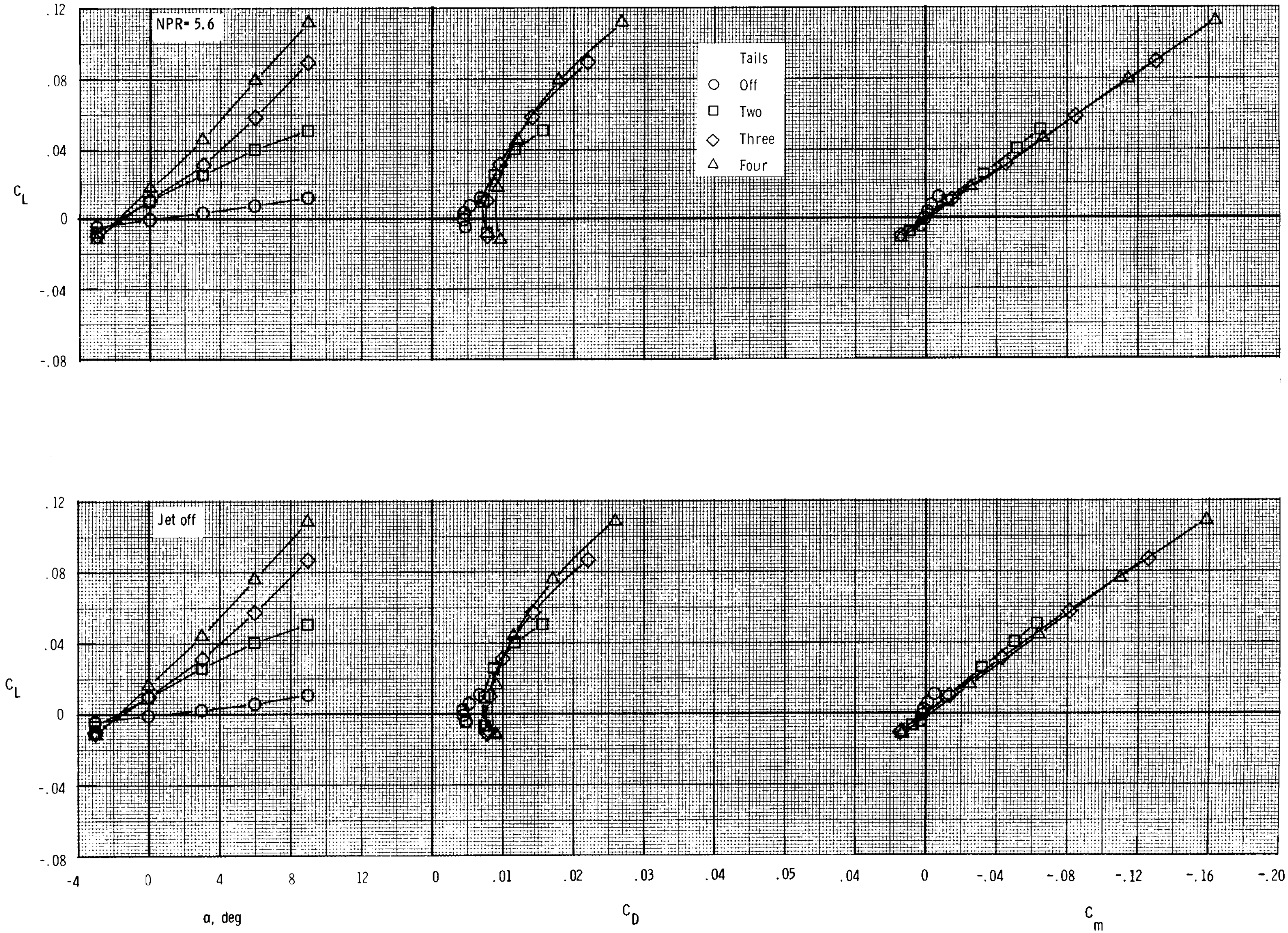
(c) $M = 0.90$.

Figure 11. Continued.



(d) $M = 1.20$.

Figure 11. Concluded.



(a) $M = 0.60$.

Figure 12. Effect of tail configuration on aft-end aerodynamic characteristics for high-aspect-ratio nozzle with $\delta_v = 0°$.

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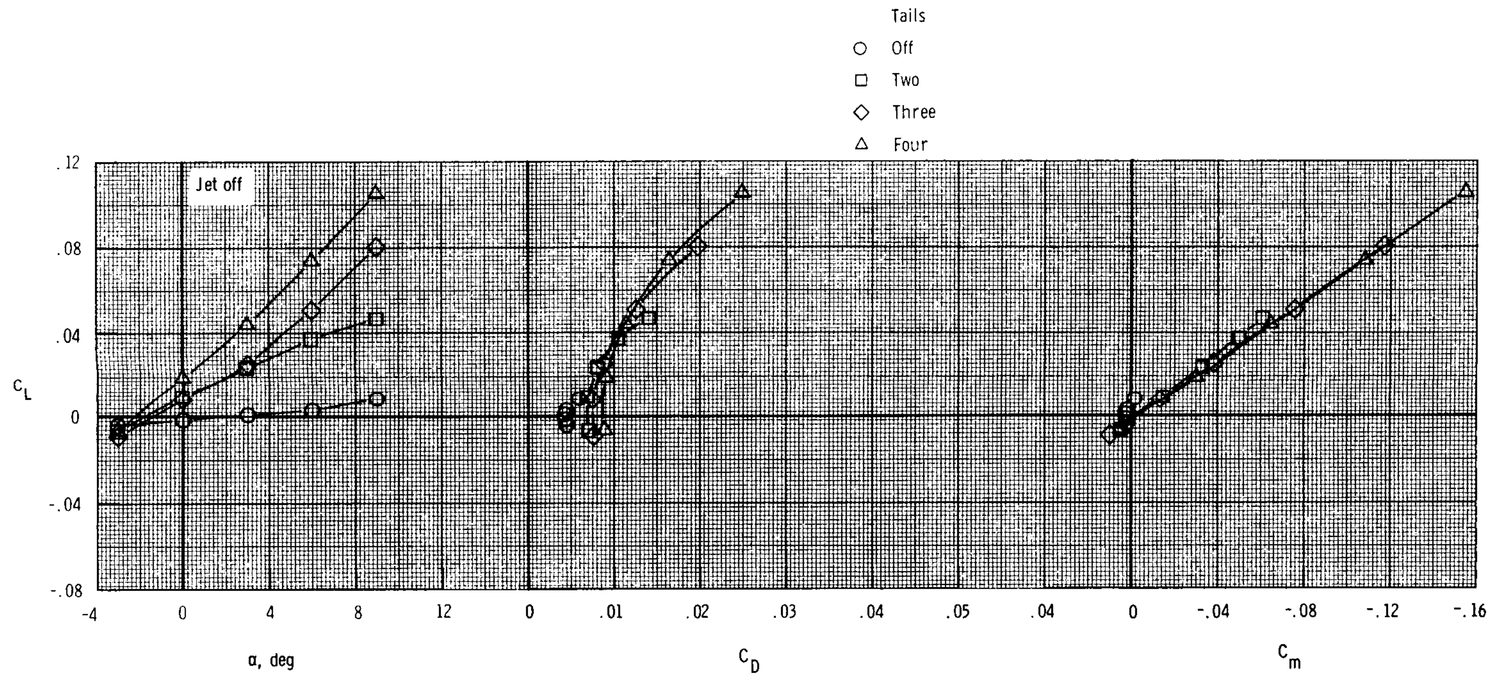
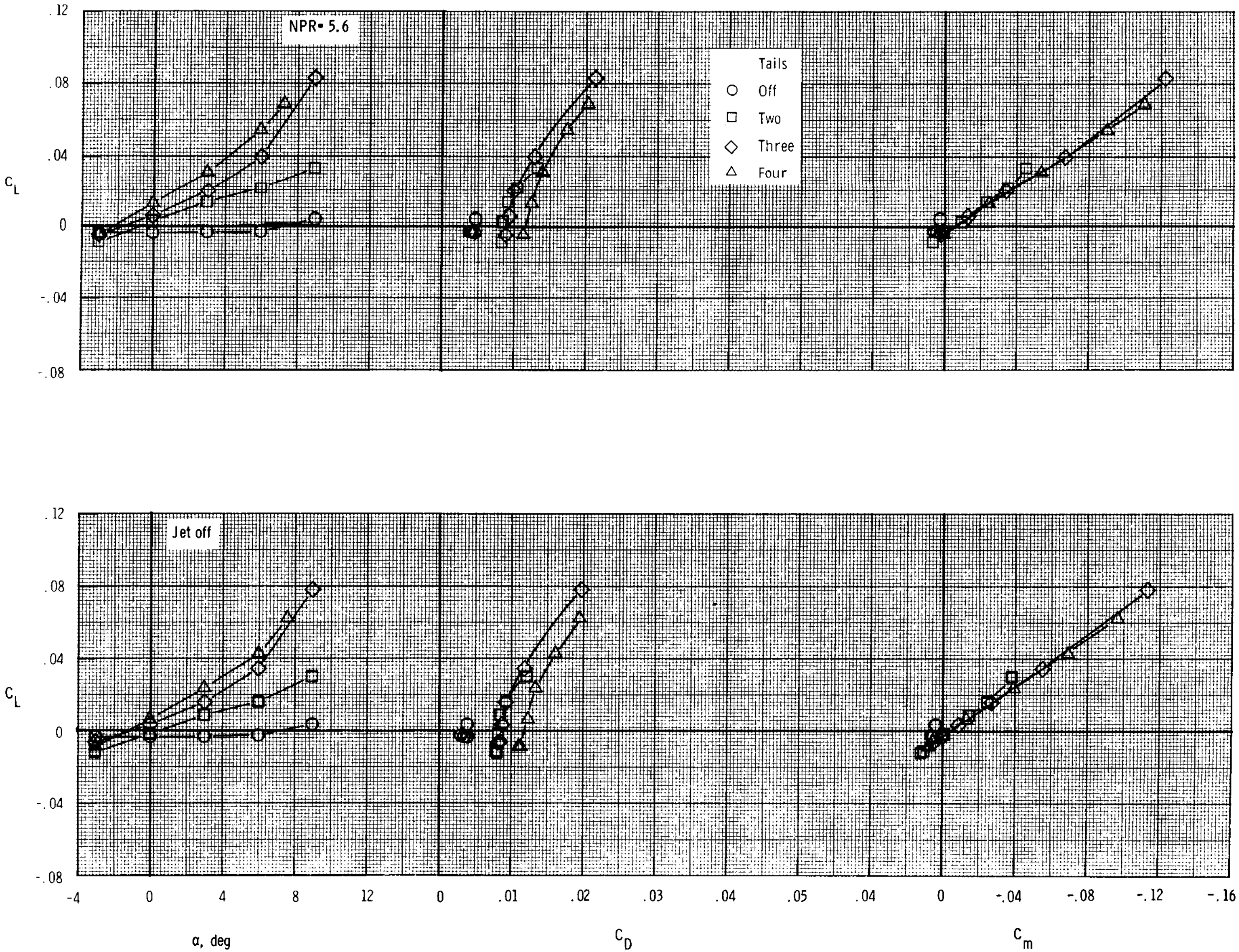


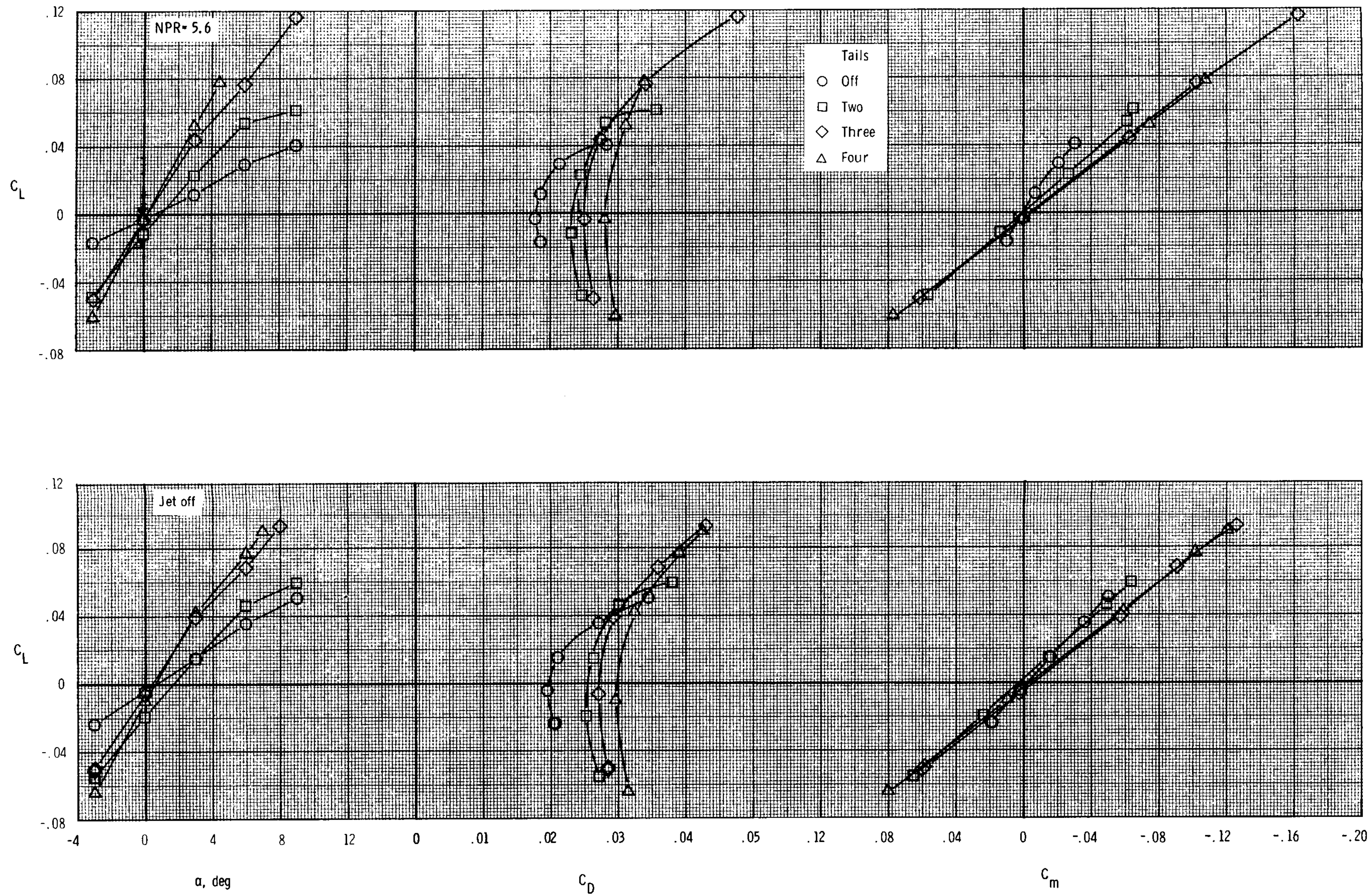
(b) $M = 0.80$.

Figure 12. Continued.



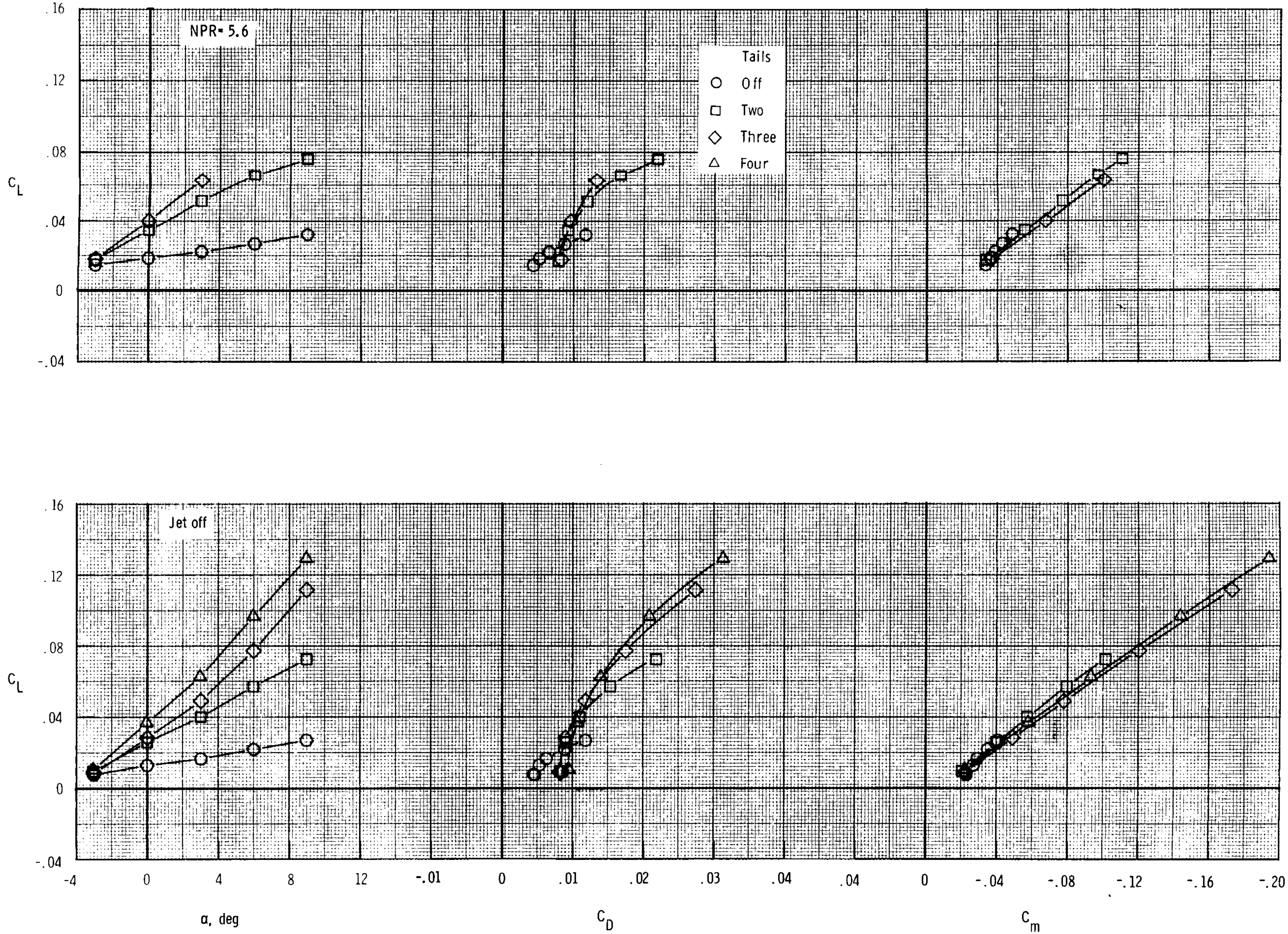
(c) $M = 0.90$.

Figure 12. Continued.



(d) $M = 1.20$.

Figure 12. Concluded.



(a) $M = 0.60$.

Figure 13. Effect of tail configuration on aft-end aerodynamic characteristics for high-aspect-ratio nozzle with $\delta_v = 10^\circ$.

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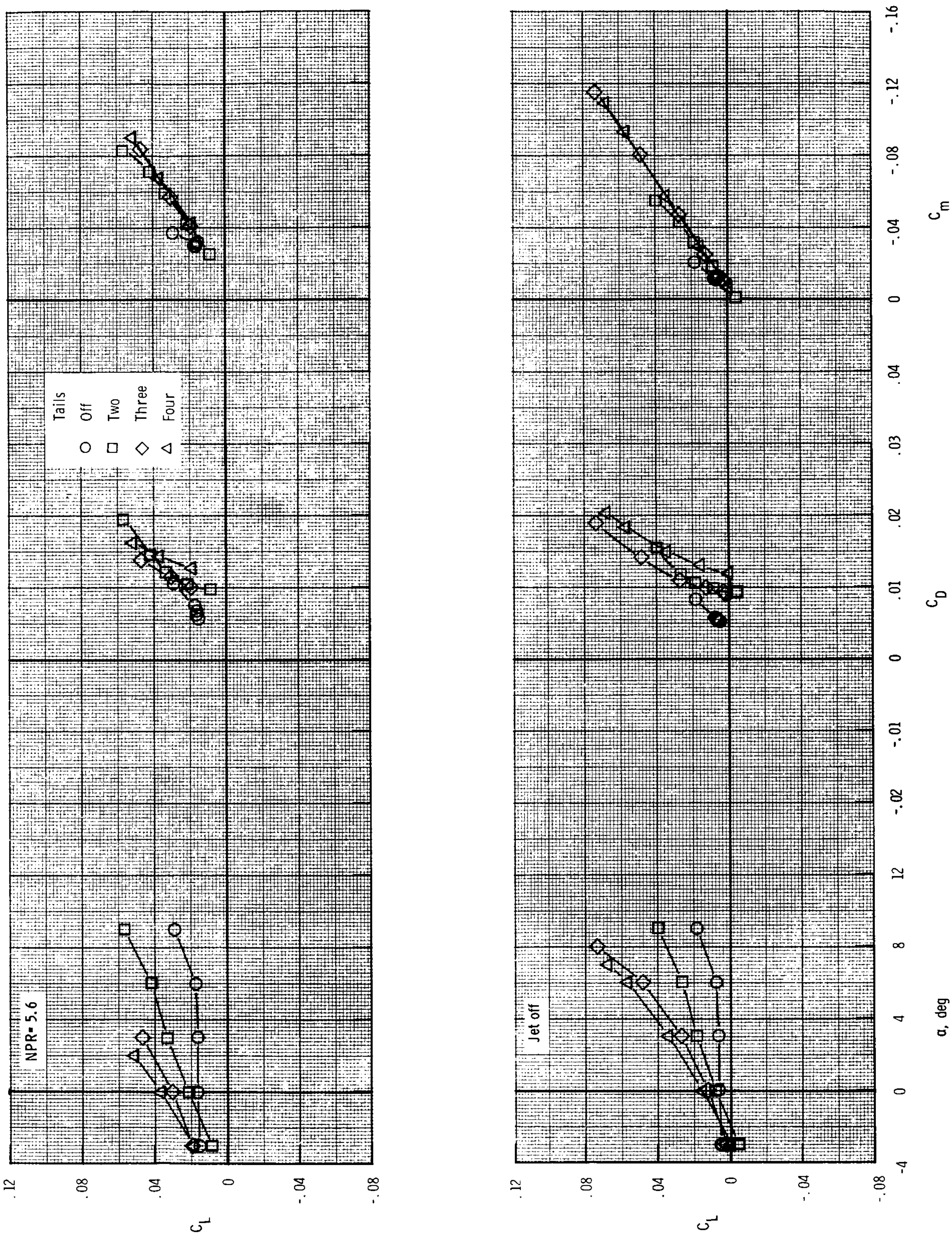
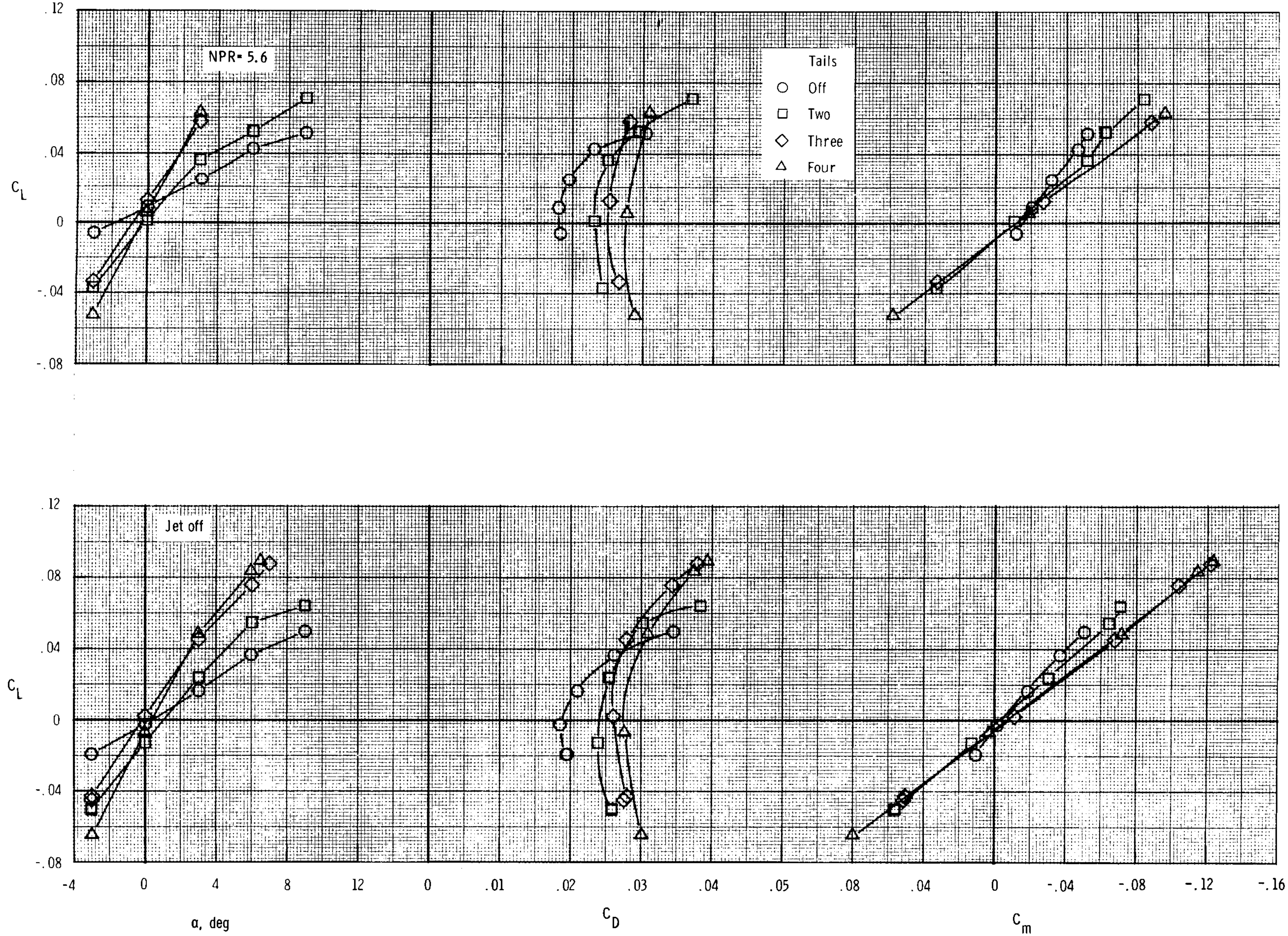


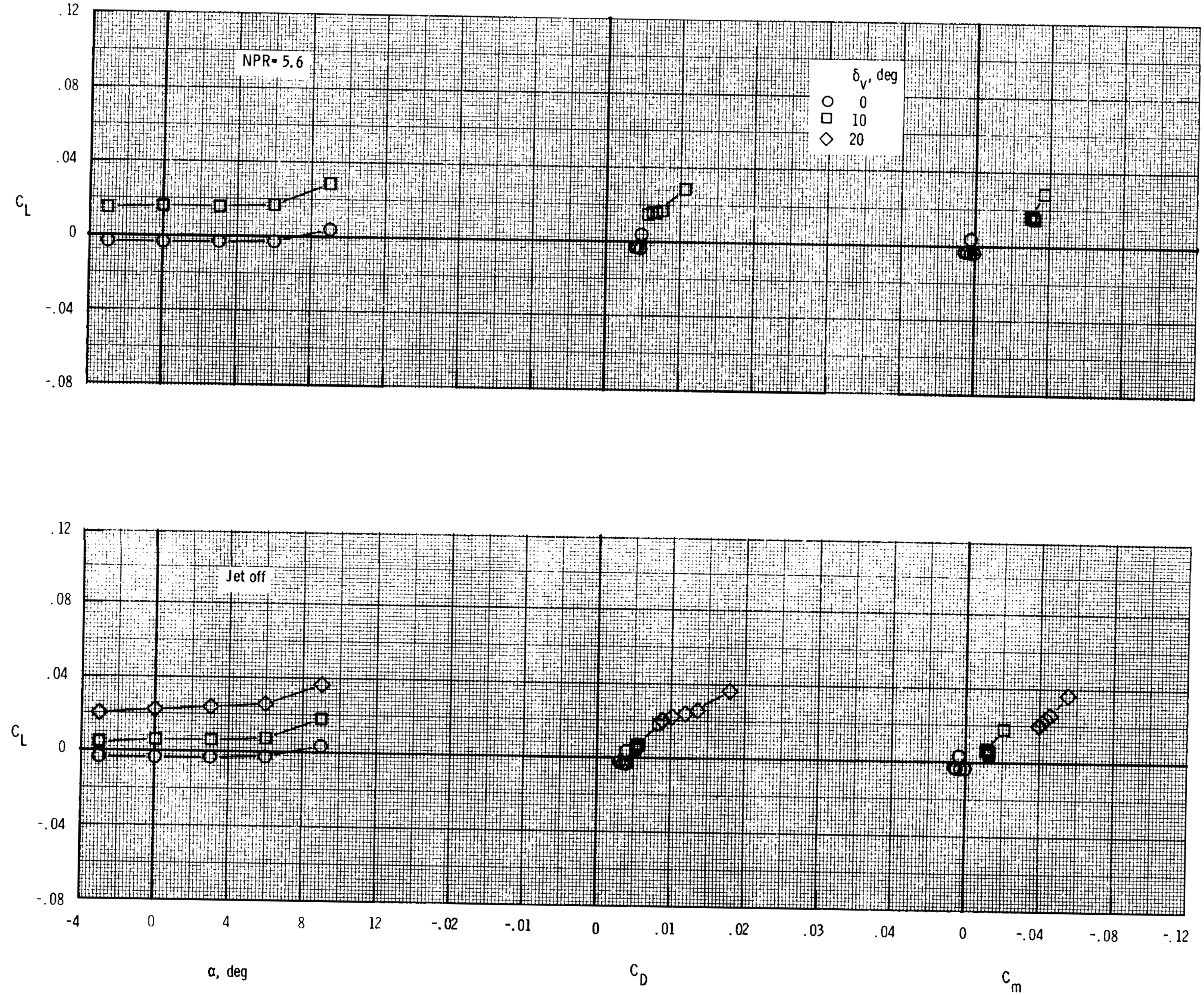
(b) $M = 0.90$.

Figure 13. Continued.



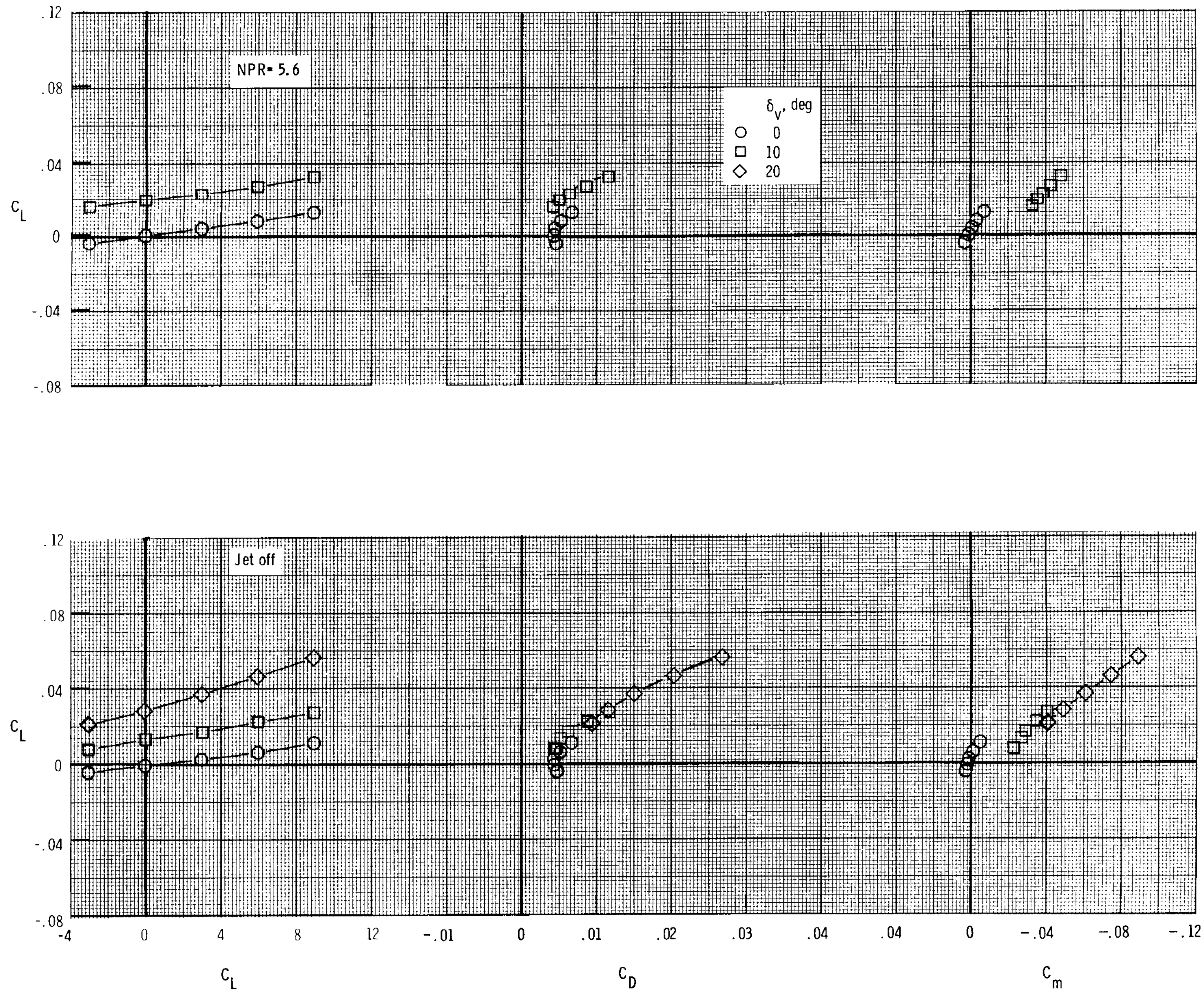
(c) $M = 1.20$.

Figure 13. Concluded.



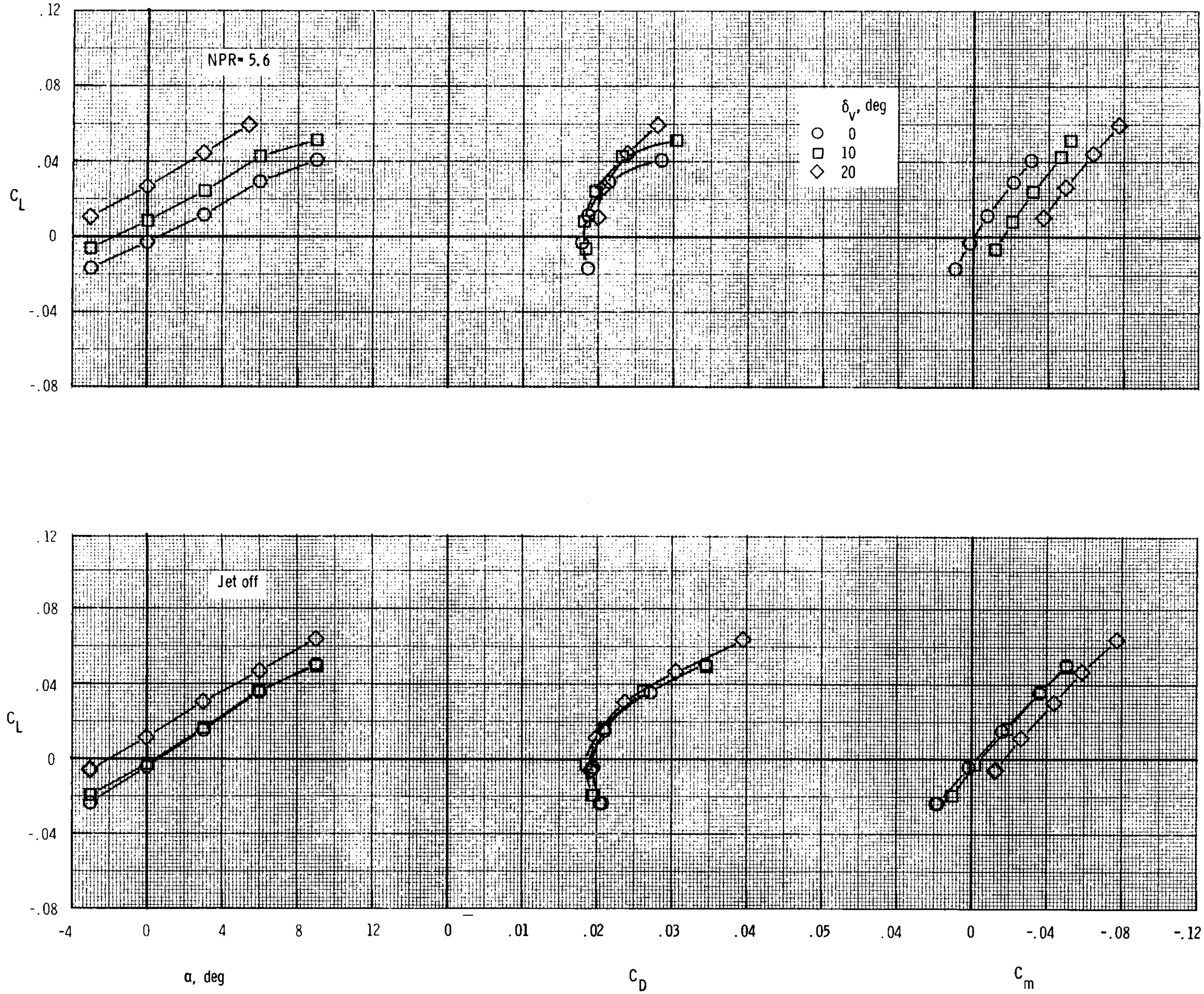
(a) $M = 0.60$.

Figure 14. Effect of design thrust vector angle on aft-end aerodynamic characteristics for high-aspect-ratio nozzle with tails off.



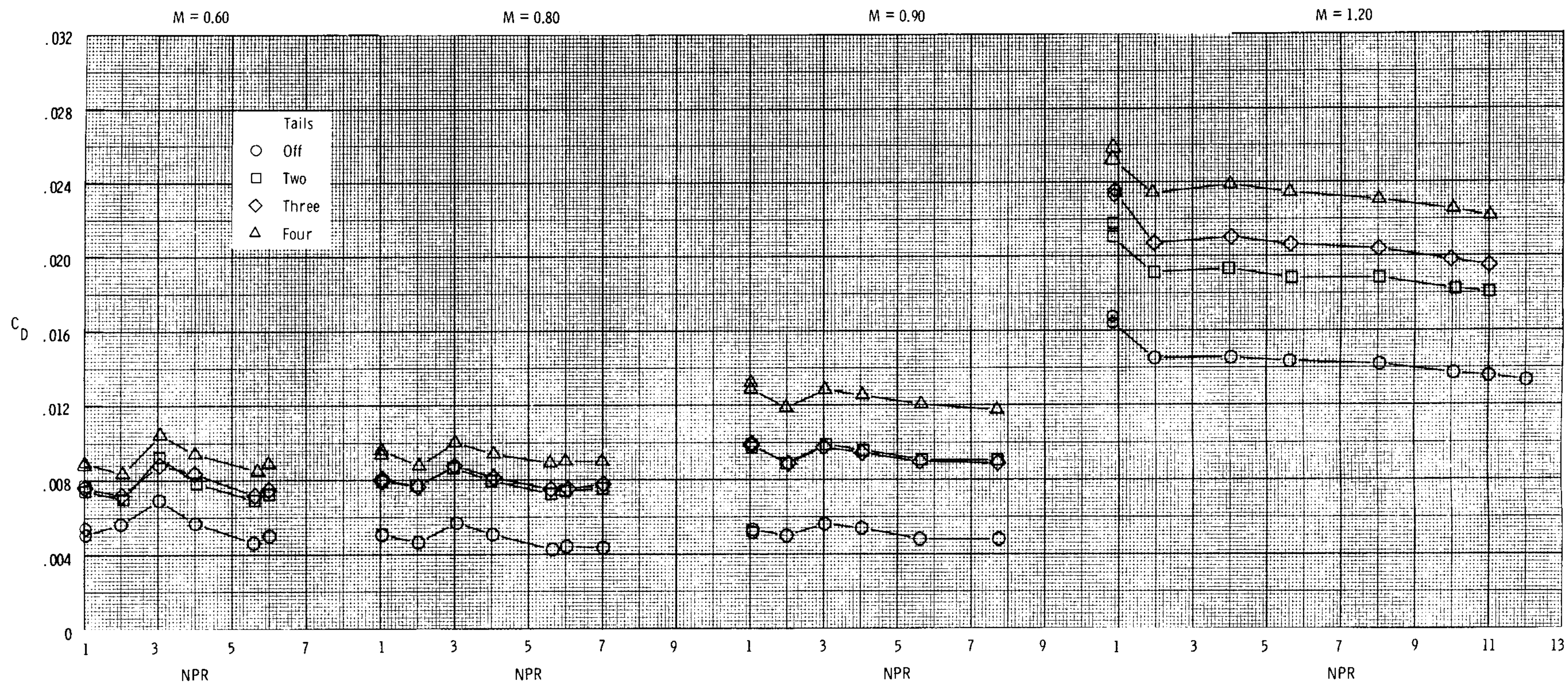
(b) $M = 0.90$.

Figure 14. Continued.



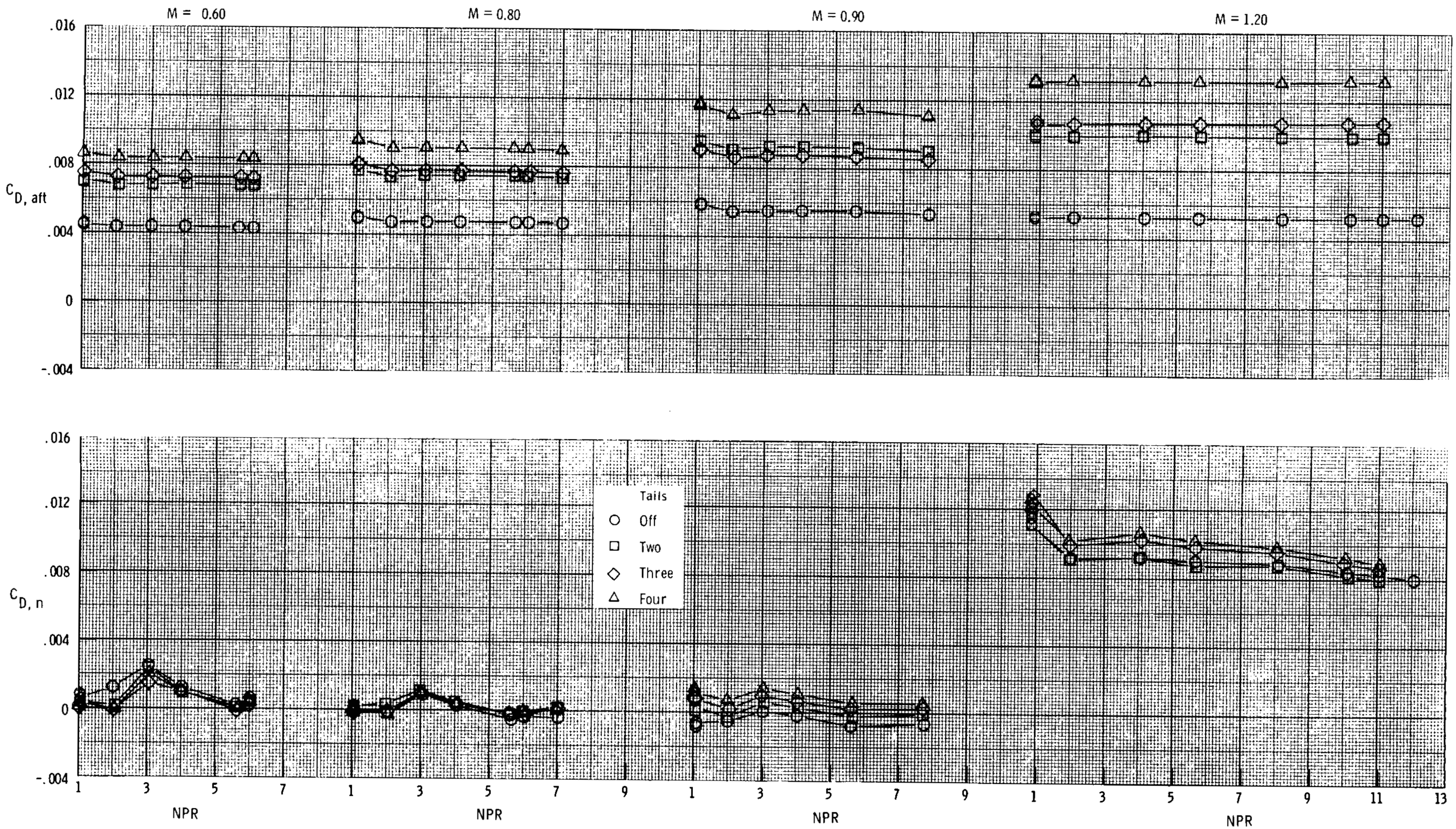
(c) $M = 1.20$.

Figure 14. Concluded.



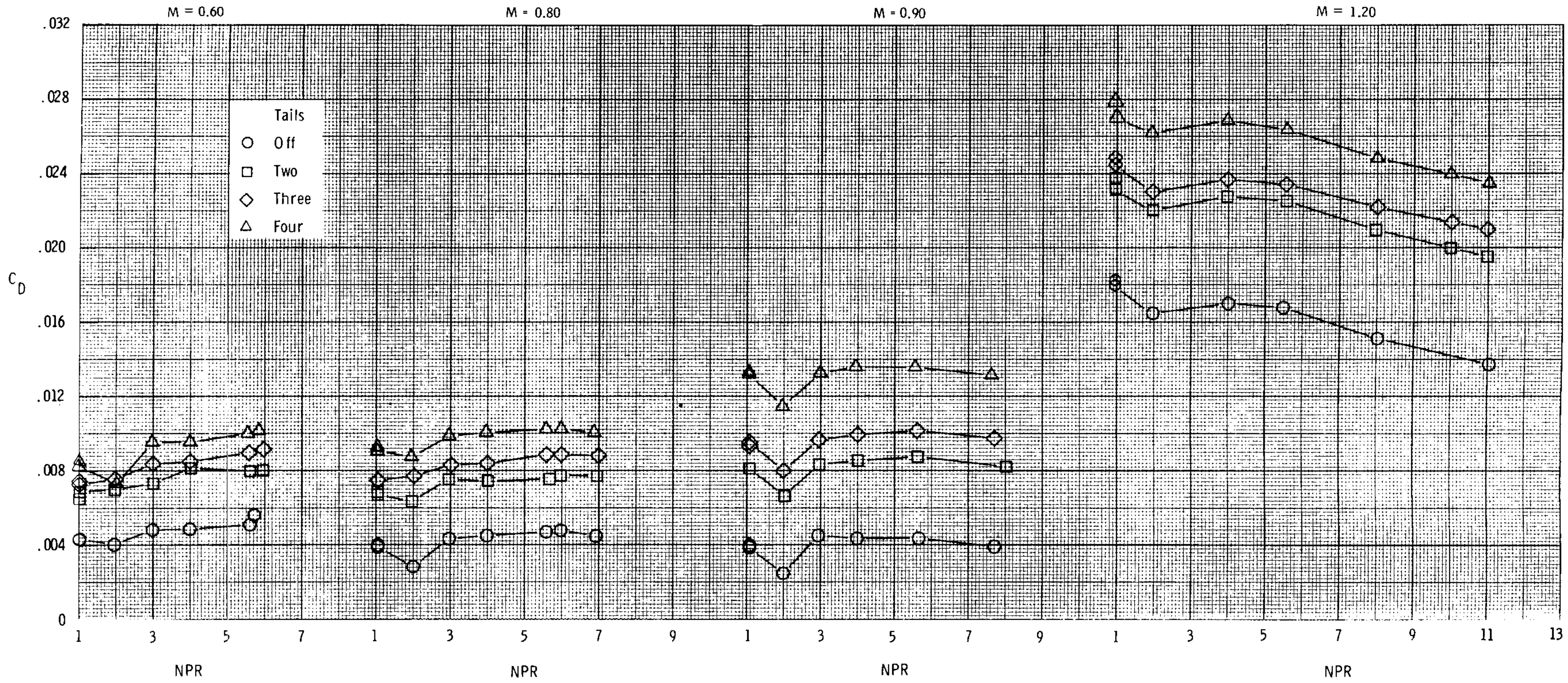
(a) C_D versus NPR.

Figure 15. Effect of tail configuration on aft-end aerodynamic characteristics for twin axisymmetric nozzles with $\alpha = 0°$.



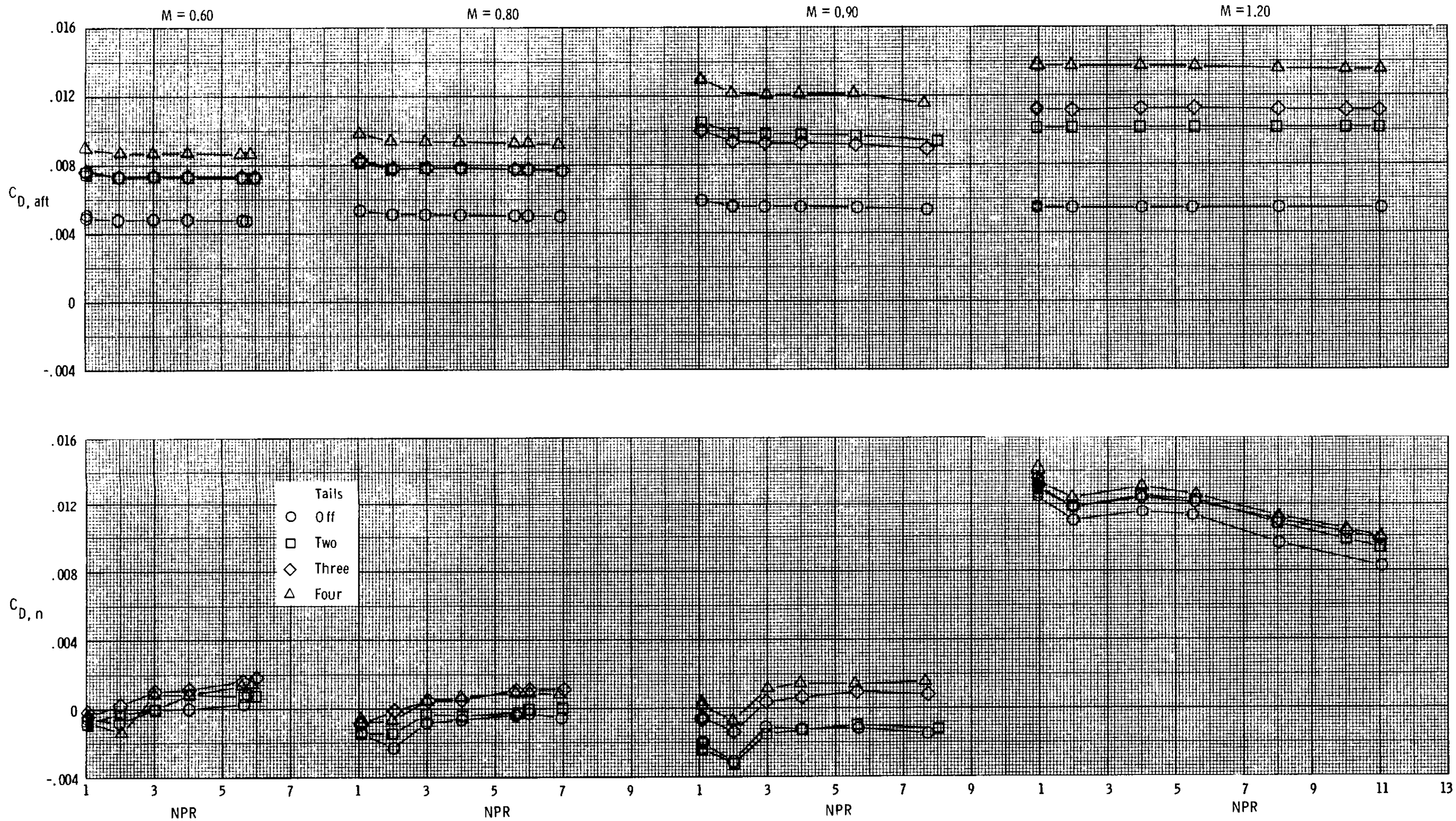
(b) $C_{D,\mathrm{aft}}$ and $C_{D,n}$ versus NPR.

Figure 15. Concluded.



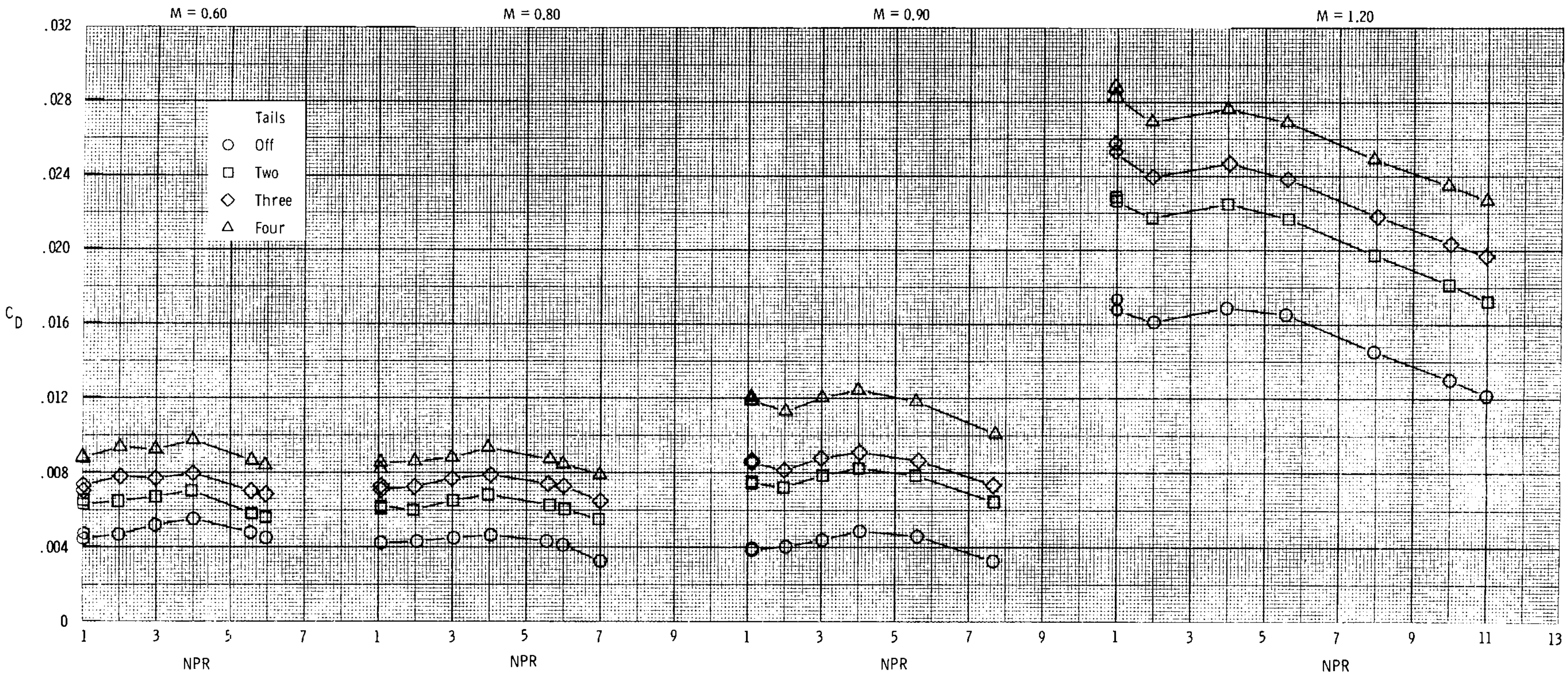
(a) C_D versus NPR.

Figure 16. Effect of tail configuration on aft-end aerodynamic characteristics for low-aspect-ratio nozzle with $\alpha = 0°$.



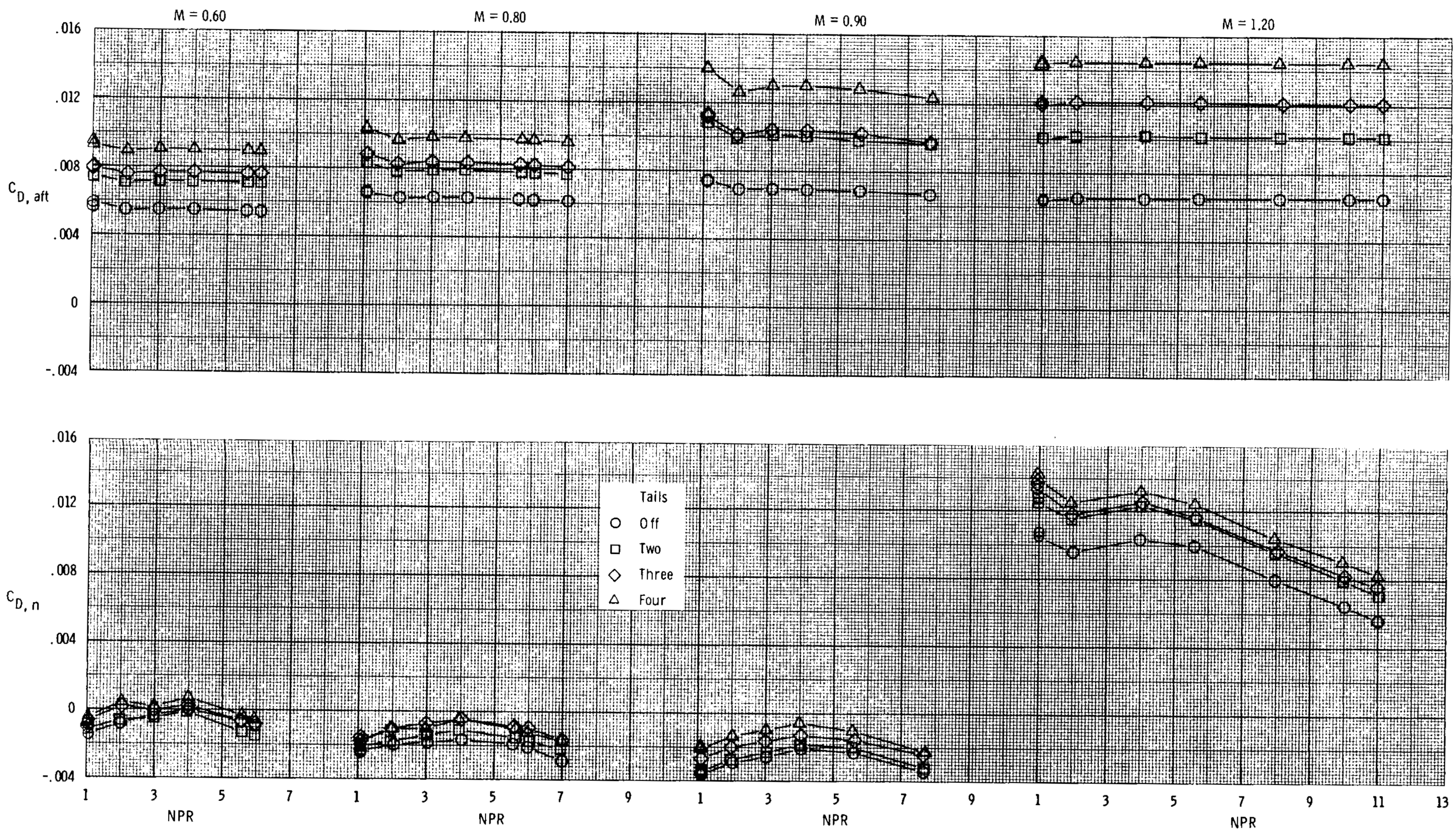
(b) $C_{D,\mathrm{aft}}$ and $C_{D,n}$ versus NPR.

Figure 16. Concluded.



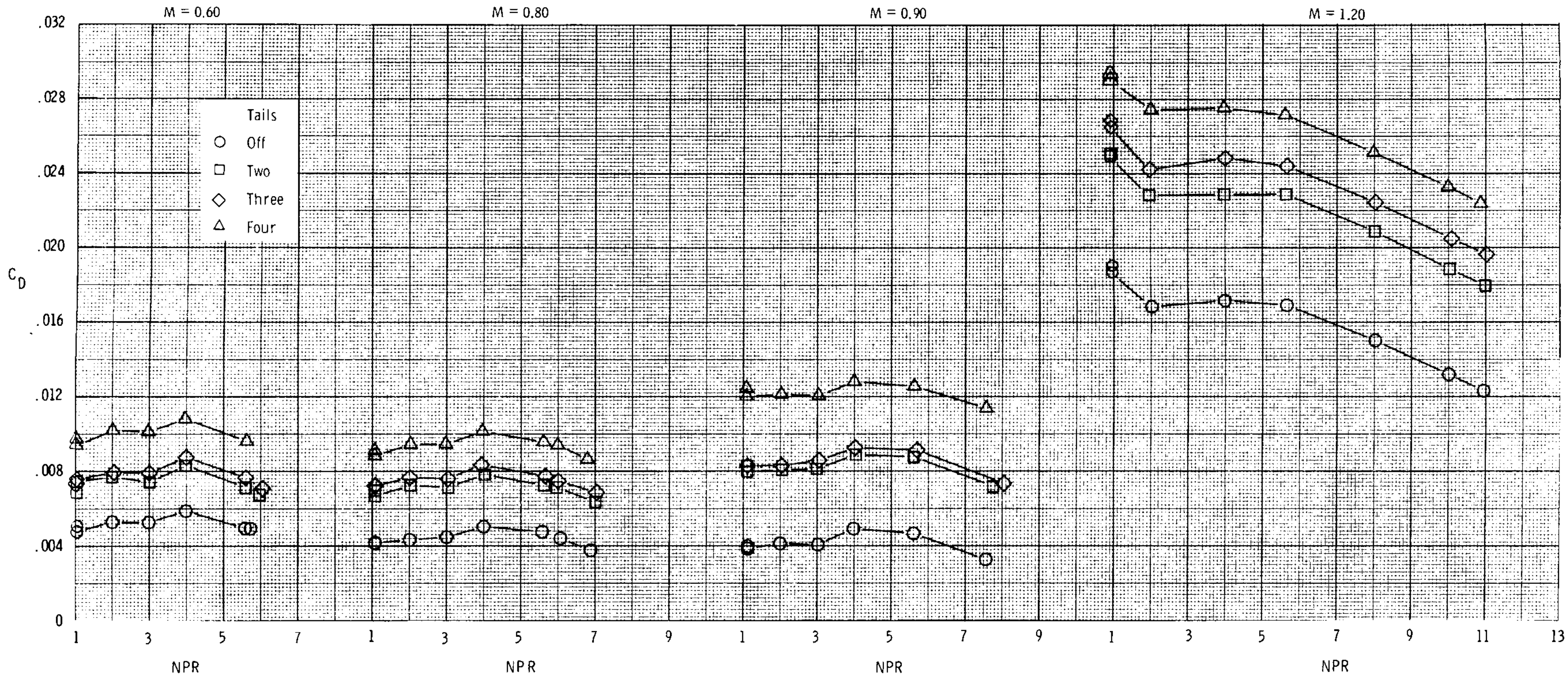
(a) C_D versus NPR.

Figure 17. Effect of tail configuration on aft-end aerodynamic characteristics for medium-aspect-ratio nozzle with $\delta_v = 0°$ and $\alpha = 0°$.



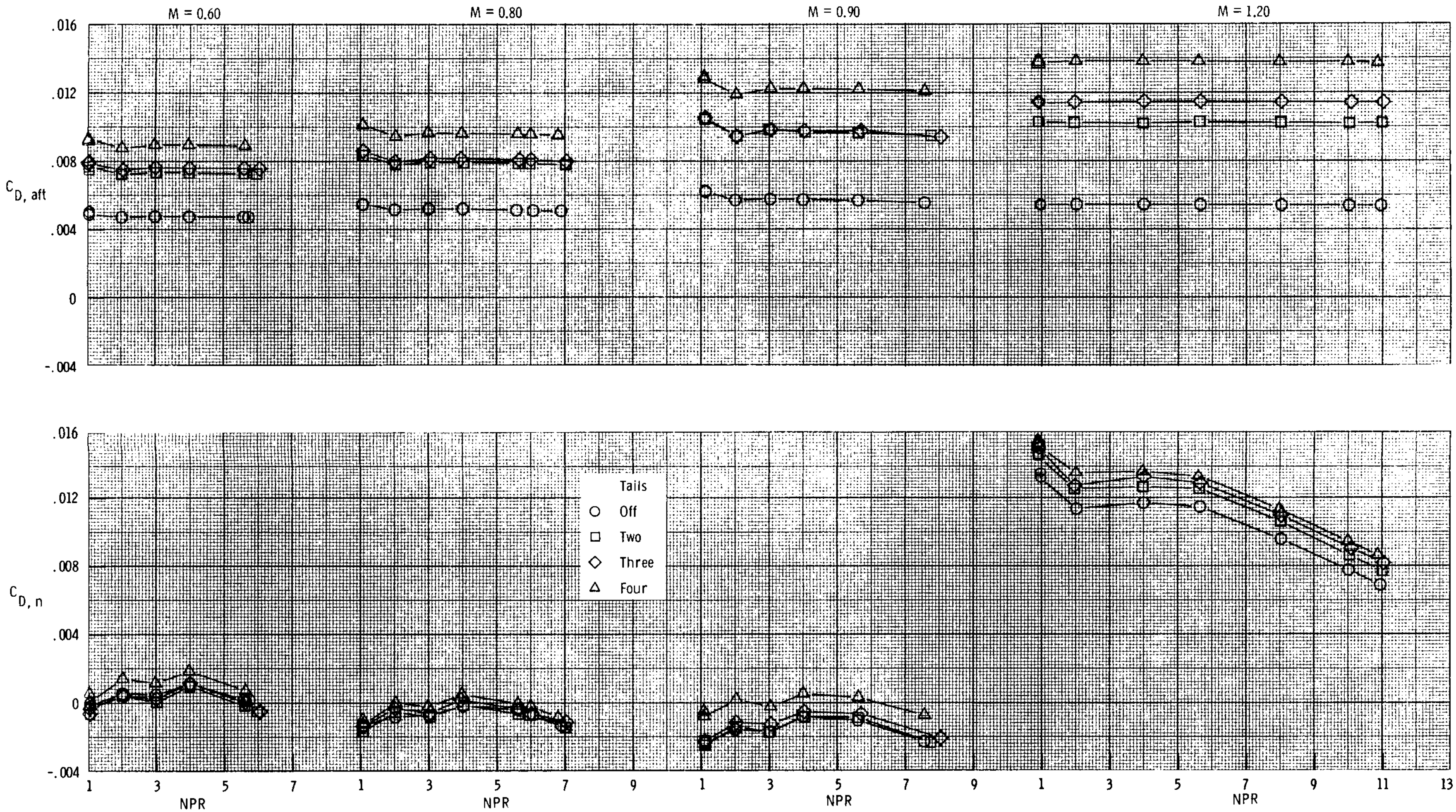
(b) $C_{D,\mathrm{aft}}$ and $C_{D,n}$ versus NPR.

Figure 17. Concluded.



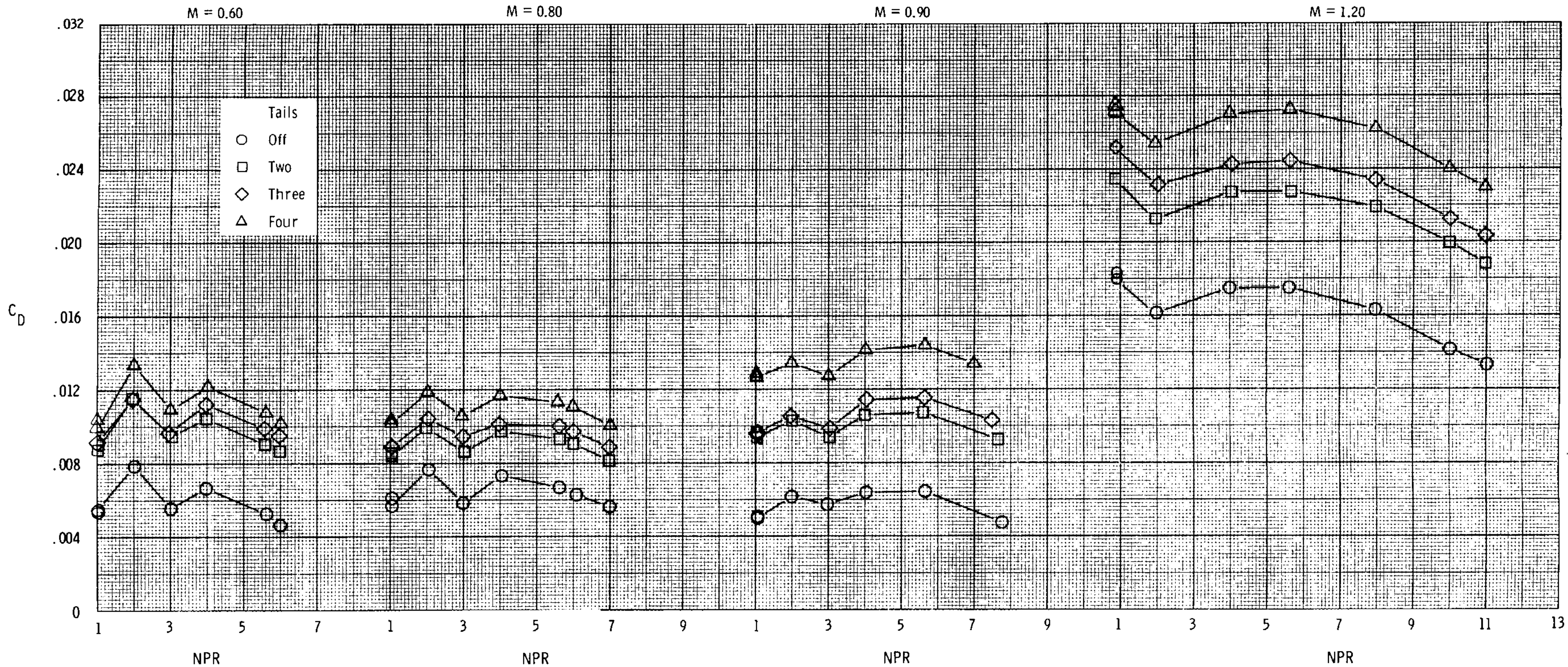
(a) C_D versus NPR.

Figure 18. Effect of tail configuration on aft-end aerodynamic characteristics for high-aspect-ratio nozzle with $\delta_v = 0°$ and $\alpha = 0°$.



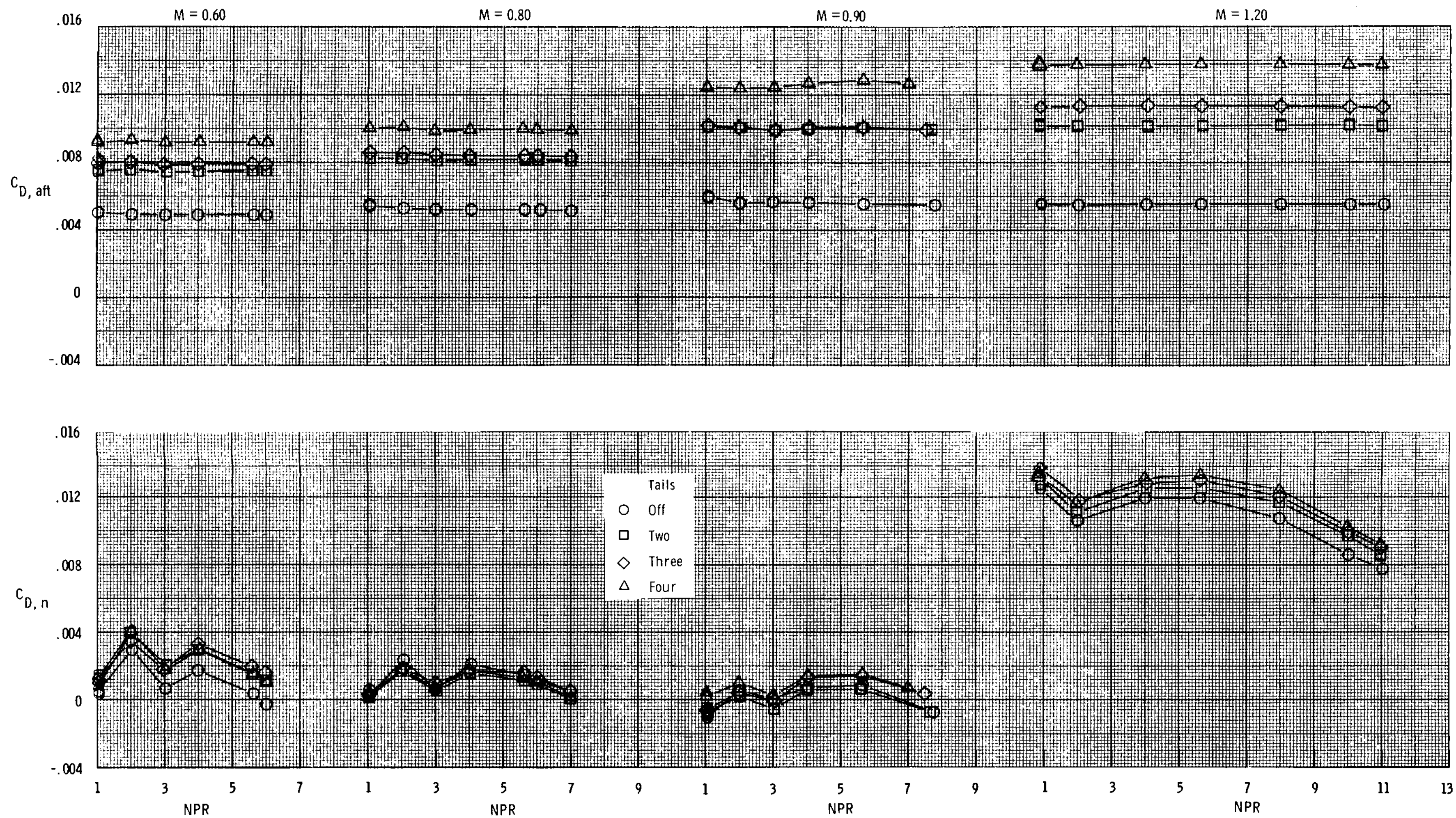
(b) $C_{D,\text{aft}}$ and $C_{D,n}$ versus NPR.

Figure 18. Concluded.



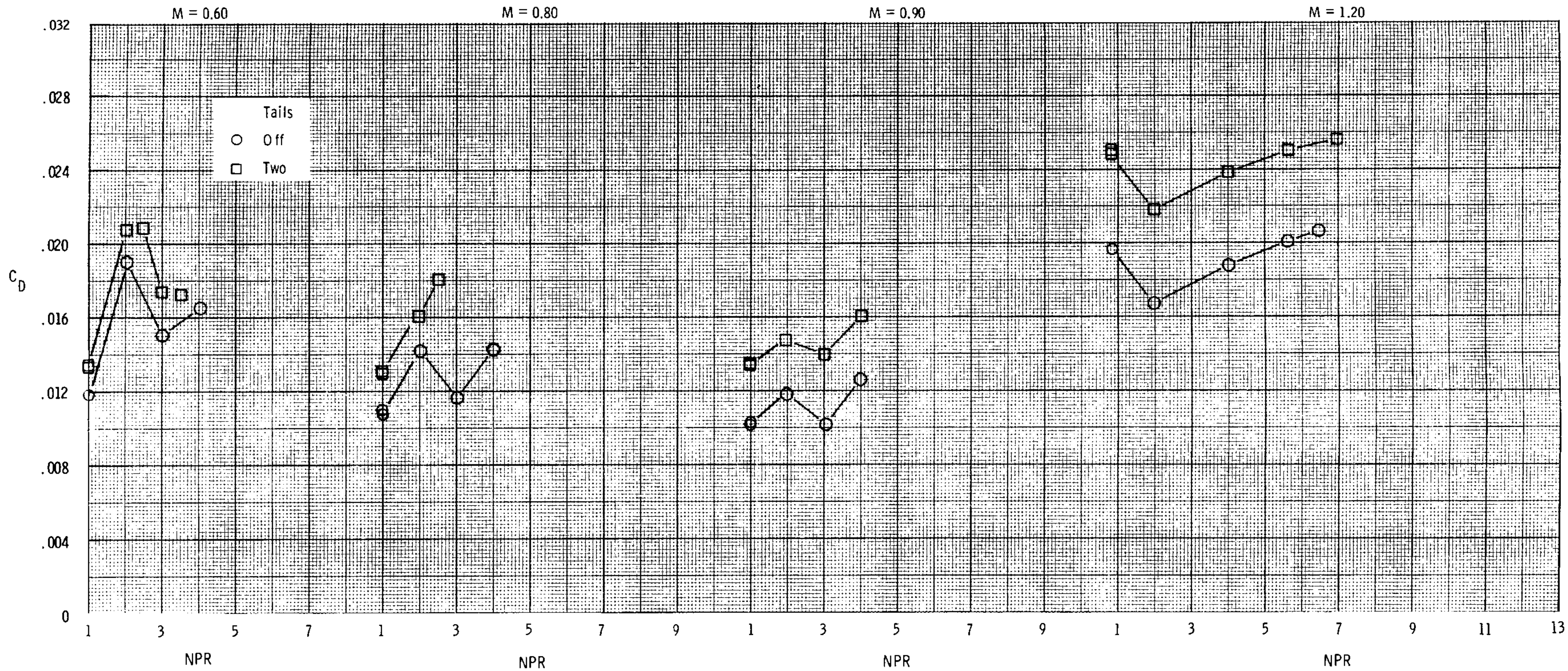
(a) C_D versus NPR.

Figure 19. Effect of tail configuration on aft-end aerodynamic characteristics for high-aspect-ratio nozzle with $\delta_v = 10^\circ$ and $\alpha = 0^\circ$.



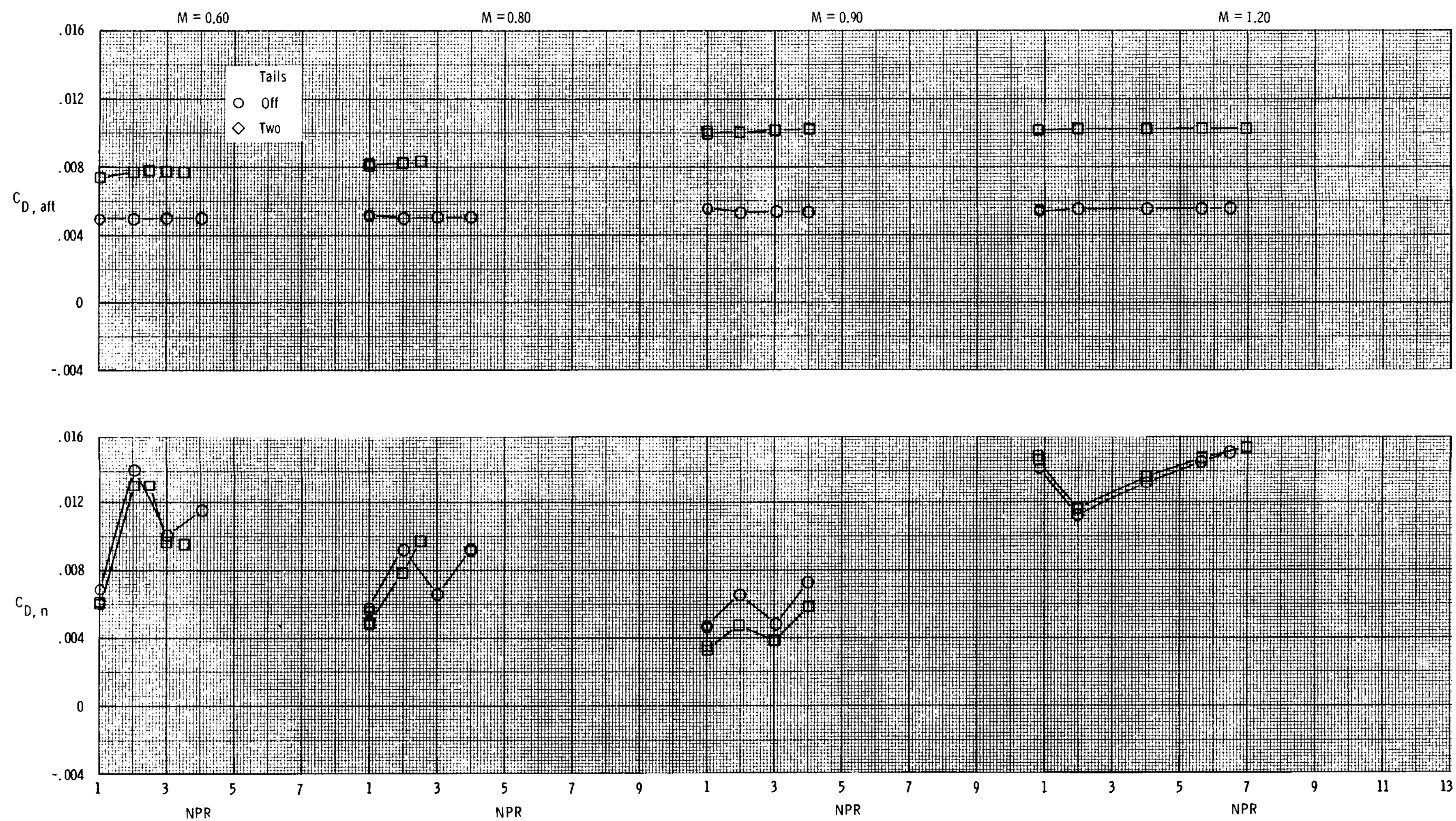
(b) $C_{D,\mathrm{aft}}$ and $C_{D,n}$ versus NPR.

Figure 19. Concluded.



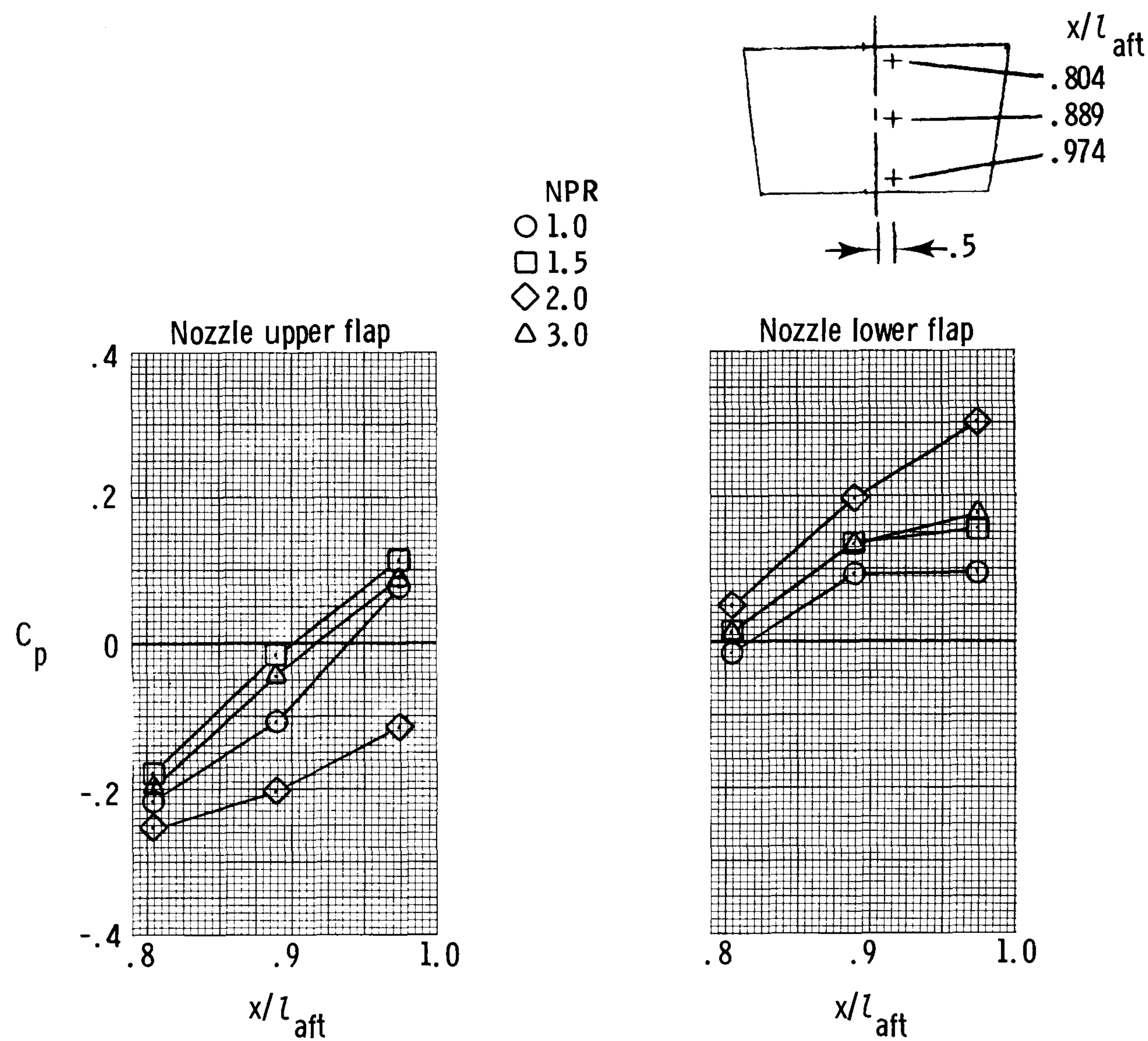
(a) C_D versus NPR.

Figure 20. Effect of tail configuration on aft-end aerodynamic characteristics for high-aspect-ratio nozzle with $\delta_v = 20^\circ$ and $\alpha = 0^\circ$.



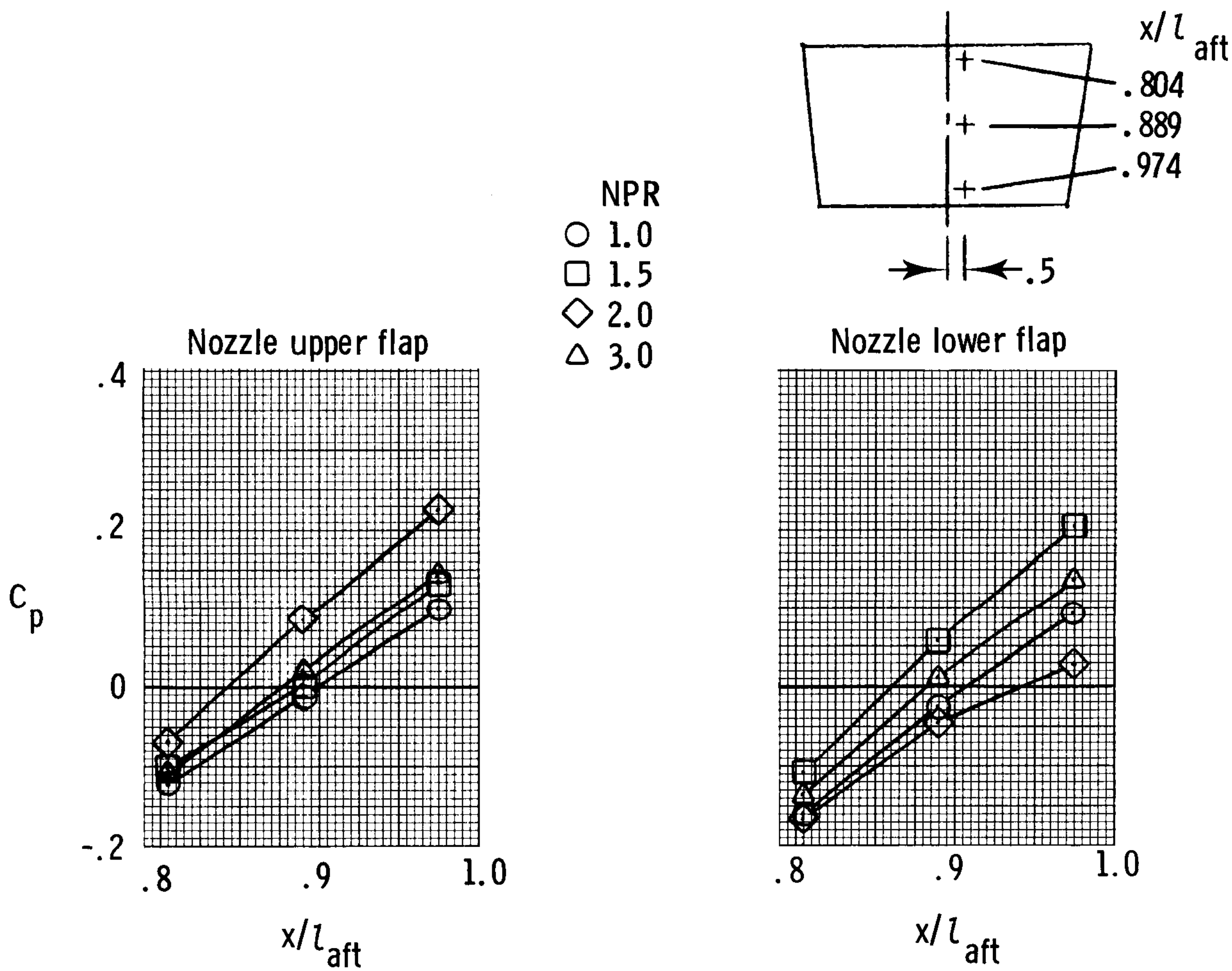
(b) $C_{D,\text{aft}}$ and $C_{D,n}$ versus NPR.

Figure 20. Concluded.



(a) $\delta_v = 10^\circ$.

Figure 21. Static pressures on nozzle upper and lower flaps with high-aspect-ratio nozzle and tails off at $M = 0.60$ and $\alpha = 0^\circ$. All dimensions are given in inches.



(b) $\delta_v = 0°$.

Figure 21. Concluded.

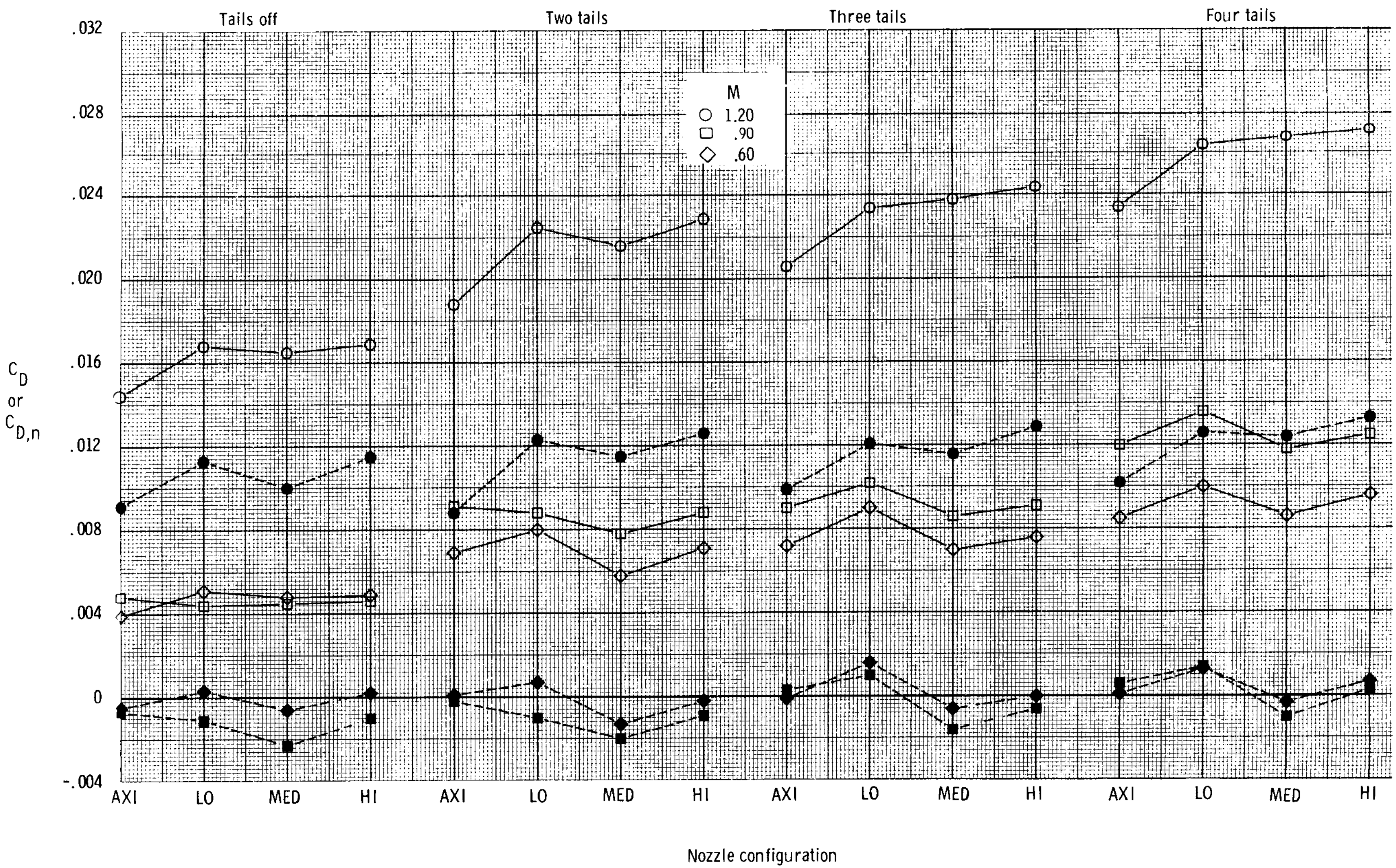
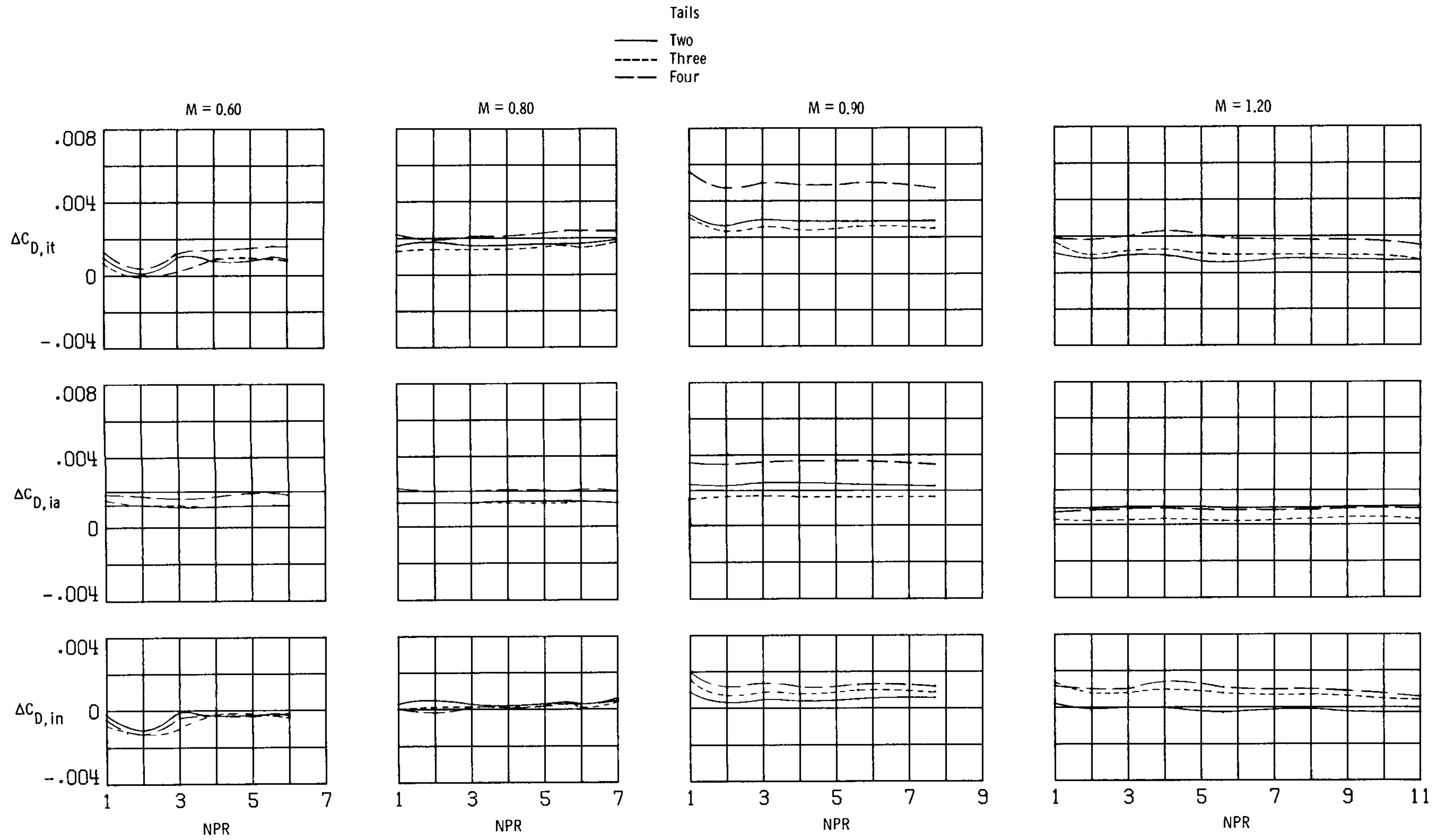
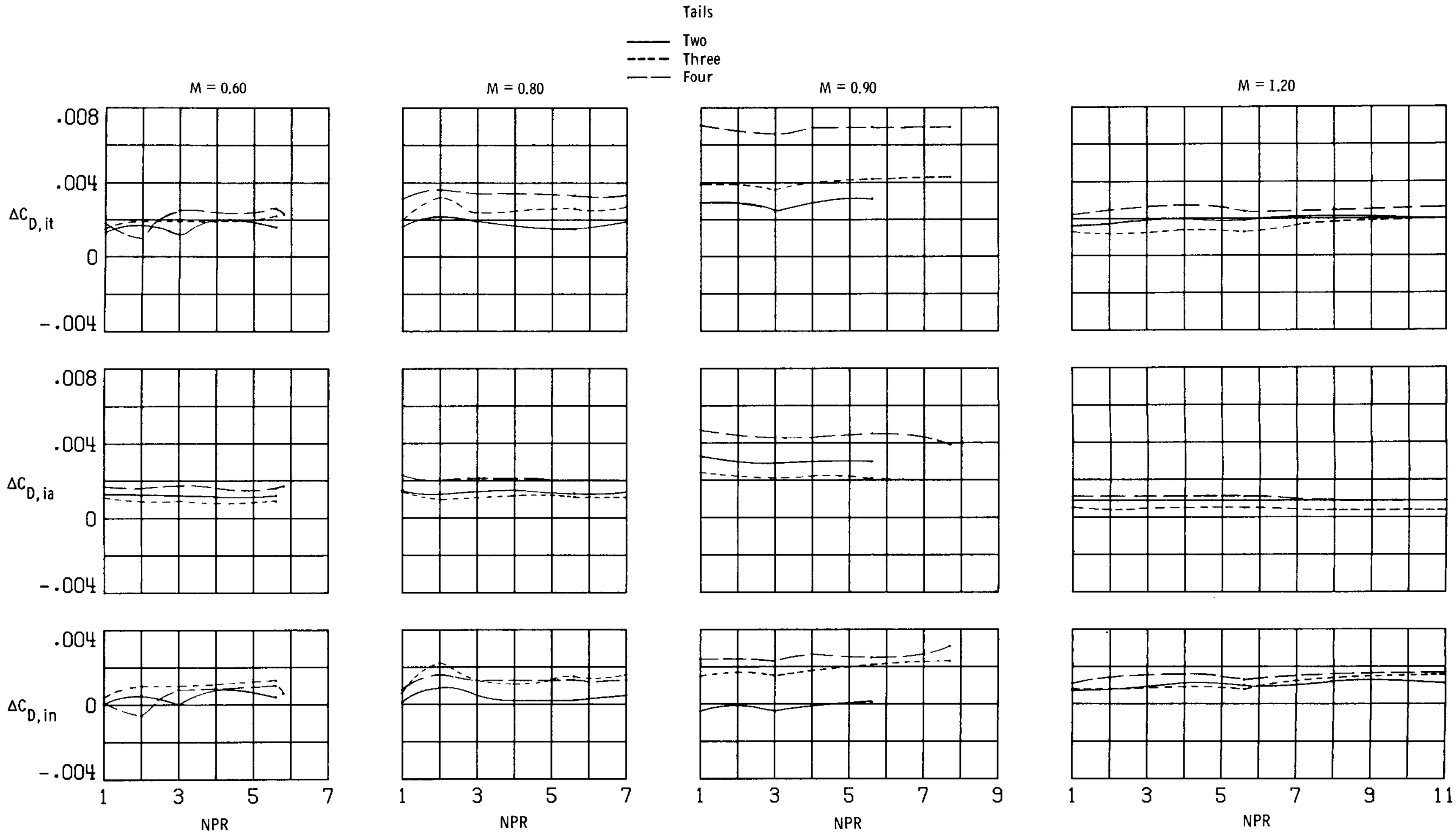


Figure 22. Effect of nozzle-tail combination on drag coefficient of entire aft end and nozzle drag coefficient with $\alpha = 0°$ and NPR = 5.6 at $\delta_v = 0°$. Open symbols denote C_D; solid symbols denote $C_{D,n}$.



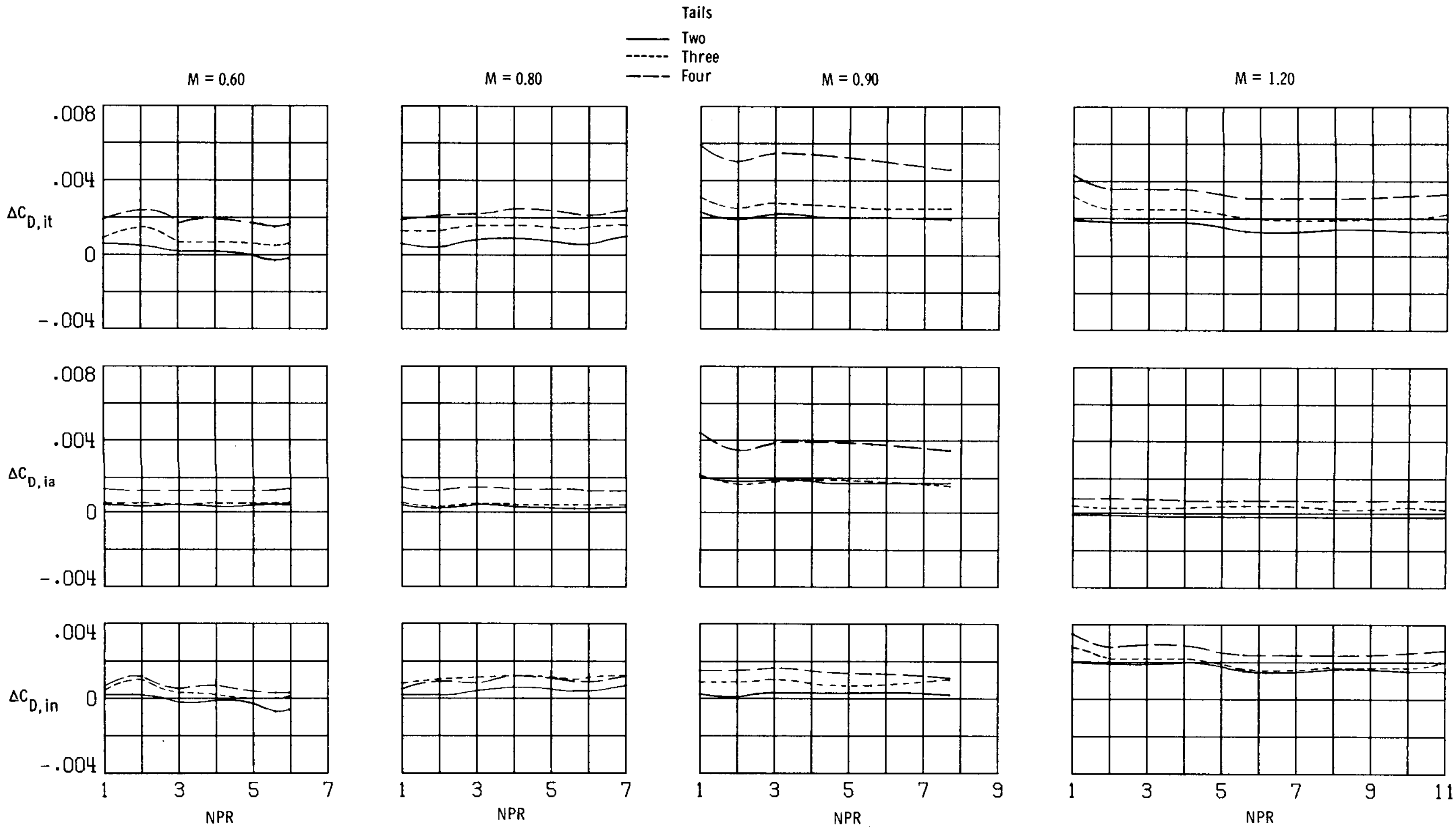
(a) AXI nozzle.

Figure 23. Effect of tail arrangement on tail interference drag increments with $\alpha = 0°$.



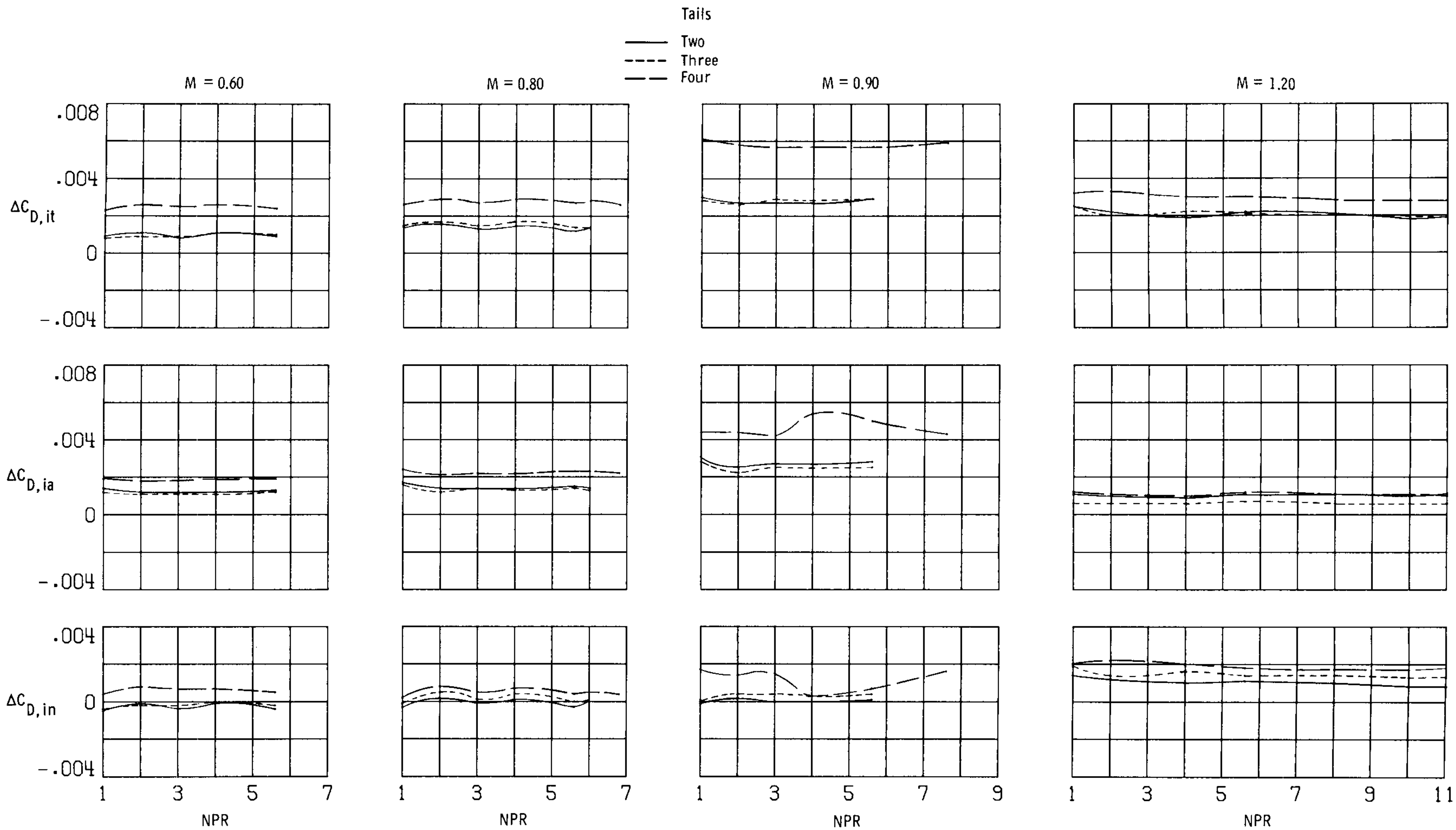
(b) LO nozzle.

Figure 23. Continued.



(c) MED nozzle with $\delta_v = 0°$.

Figure 23. Continued.



(d) HI nozzle with $\delta_v = 0°$.

Figure 23. Concluded.

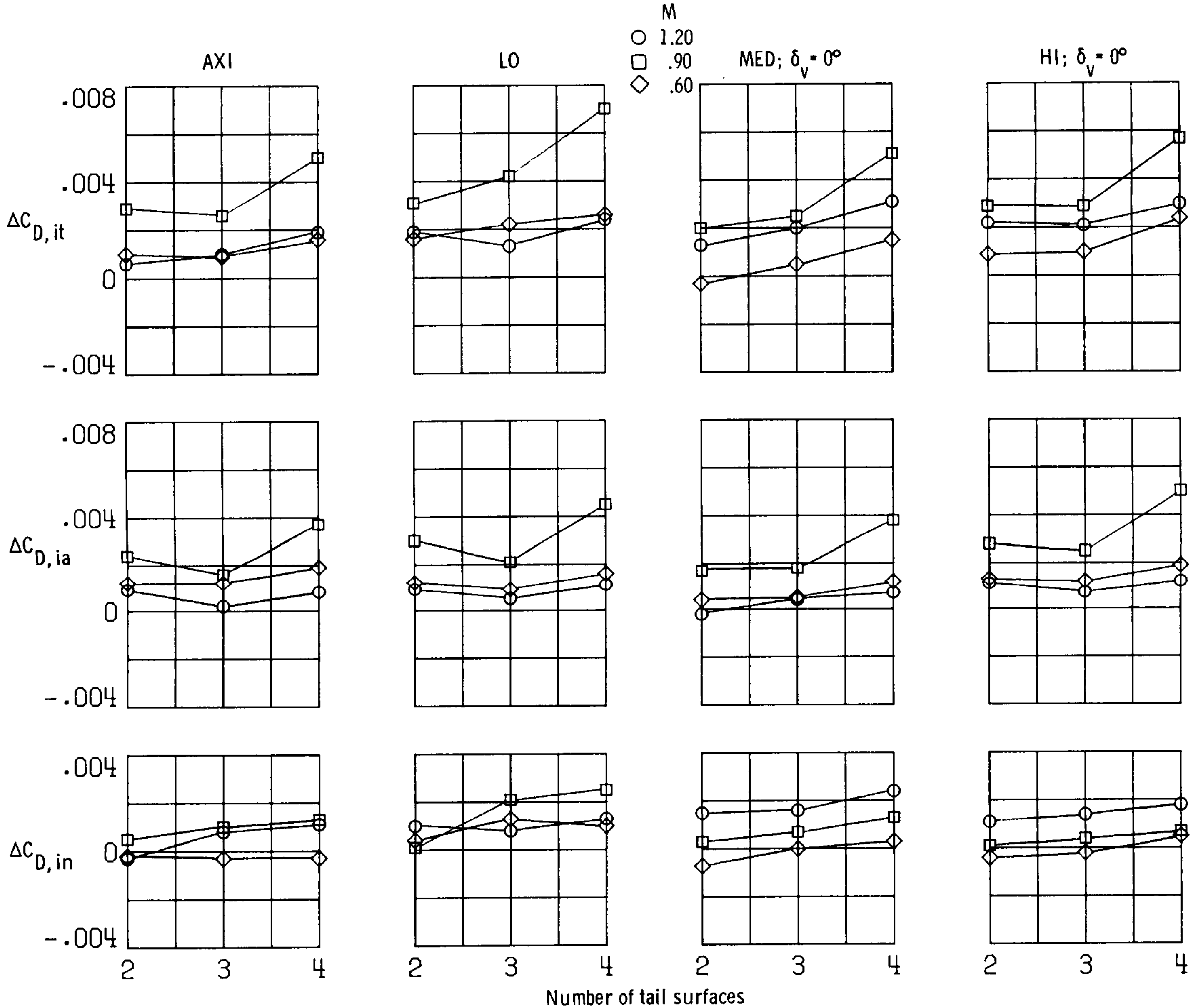


Figure 24. Summary of tail interference drag increments with $\alpha = 0°$ and NPR = 5.6. Symbols represent interpolated data.

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16. Abstract

The effects of empennage arrangement and afterbody boattail design (upper/lower nozzle-flap boattail angle versus nozzle-sidewall boattail angle) of nonaxisymmetric nozzles on the aeropropulsive characteristics of a twin-engine fighter-type model have been determined in an investigation conducted in the Langley 16-Foot Transonic Tunnel. Three nonaxisymmetric and one twin axisymmetric convergent-divergent nozzle configurations were tested with three different tail arrangements: a two-tail V-shaped arrangement; a staggered, conventional three-tail arrangement; and a four-tail arrangement similar to that on the F-18. Two of the nonaxisymmetric nozzles were also vectorable. Tests were conducted at Mach numbers from 0.60 to 1.20 over an angle-of-attack range from $-3°$ to $9°$. Nozzle pressure ratio was varied from 1 (jet off) to approximately 12, depending on Mach number. Results of this study indicate that at design nozzle pressure ratio, the medium-aspect-ratio nozzle (with equal boattail angles on the nozzle sidewalls and upper and lower flaps) had the lowest zero-angle-of-attack drag of the nonaxisymmetric nozzles for all tail configurations at subsonic Mach numbers. The drag levels of the twin axisymmetric nozzles were competitive with those of the medium-aspect-ratio nozzle at subsonic Mach numbers and clearly had the lowest drag at a Mach number of 1.20.

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